REPORT

OF

THE COMMITTEE

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ON

STEAM COMMUNICATION WITH INDIA,

VIÀ

THE RED SEA;

LONDON:
SMITH, ELDER AND Co., 65, CORNHILL.

1839.

SELECT COMMITTEE ON STEAM COMMUNICATION WITH INDIA.

1837.

OOTTERPARAH PUBLIC LIBRARY 1859

MINUTES OF EVIDENCE TAKEN BEFORE

THE

SELECT COMMITTEE APPOINTED TO INQUIRE INTO THE BEST MEANS OF ESTABLISHING A COMMUNICATION BY STEAM WITH INDIA, BY WAY OF THE RED SEA.

Martis, 13th die Junii, 1837.

MEMBERS PRESENT.

Mr Bagshaw	Sir J. C. Hobhouse.
Lord William Bentinck	Mr. Mullins.
Mr R Gordon	Lord Sandon.
Sir James Graham	Sir T. Trowbridge.
Mr S. Herbert	

LORD WILLIAM BENTINCK, in the Chair.

A Petition of several bankers, merchants, manufacturers and others, from Birmingham, in favour of the proposed measure, read.

Mr. *Thomas Waghorn* was then called in; and Examined, as follows:

1. *Chairman.*] WILL you hand in the statement which you have prepared upon this subject?—

[*The following Statement was then handed in, and read by the Witness:*]

" London, 71, Cornhill, 13 June, 1837.

" To the Right Honourable Lord William Bentinck and the Members of the Steam Committee, in the Red Sea, appointed by Resolution of the House of Commons, 9th June, 1837.

" My Lord and Gentlemen,

" My name and pursuits are doubtless known to each of you. I leave England to-morrow for Egypt, by way of Marseilles, encharged, by the East India Company and the India Board in that quarter, for the Establishment of steam communication between England and India, by way of the Red Sea.

" Many writers, especially of late, have endeavoured to give the public information, by their prolific ideas, about this said steam intercourse: had they not done so, and thereby confused instead of throwing light on the subject, the writer would not have troubled your Lordship and the Committee with this letter at his departure. The Honourable Court of Directors of the East India Company, and the India Board, have already sent out orders to the Governor General of India to place the Hugh Lindsay steam vessel between Suez and Mocha, to carry mails, passengers, &c. and the Atalanta and Berenice steamers between Mocha and Bombay, according to the original Resolution of the House of Commons of July 1834, for effecting steam intercourse with India by this route: besides which, much also is in progress by these authorities. That much is done, and more, much more, will be done by them in due course; and it will be for your Lordship and the Committee to carefully search out the cheapest and most efficient way of enlarging and improving this same steam intercourse on the most comprehensive scale, and carrying it to the three presidencies of India.

" My opinion is fixed; it is as follows: That so long as there is that perfect understanding between the English and French governments, that the route by Marseilles is the quickest, cheapest, and consequently the best that can be devised; for nothing can be better than the present organized system for the transmission of India letters, &c. by the French steamers every ten days between Marseilles and Alexandria, and *vice versâ;* unless I might suggest that Government messengers should journey through France, to and from, on these vessels carrying the confidential despatches of the Government to and from Egypt; the private letters passing, as they now do, every day (Sundays excepted) through the channel of His Majesty's and the French post-offices. The passengers will all be delighted at this route, having no longer to fear crossing the Bay of Biscay in winter on their way to and from India. Having thus fixed the English line by way of France, during peace, I now go to the other side of the Isthmus, and propose that two steam vessels should ply constantly between Suez and Mocha, having a third in ordinary at Mocha to take the place of either steamer in case of a break-down. These three steam vessels should be all of the same size, and about 550 tons burthen; the third one with only engineers in charge. Six more steamers, each of 850 tons, are required to perfect the communication from Mocha to all India, as follows: three of these steamers should go between Mocha and Calcutta, touching either way at Socotra for fuel when necessary, and anchoring at Trincomalee and Madras a certain number of hours for the delivery and receipt of every thing going to or coming from any of the above places; another of these steamers in ordinary, with engineers only, should lay at anchor in one of the two bays of Socotra, to serve as a floating depôt, and when there is a break down on the Calcutta line, this vessel can take the place of such break-down: two steamers should be given to the Bombay government, to be disposed of as it may think fit. My own opinion is, that these two vessels should not attempt the passage direct from Bombay to Mocha from the 15th of May to the 15th of September, during which four months wind and sea are dead against them; and should they attempt it, and in attempting it break down, they will have to sail all the way back to Bombay, and thus the Bombay communication will be interrupted until the other vessel takes the mails, &c. on a second time; and should she also fail, both the Bombay steamers will be knocked up in opposing the violence of the south-west monsoon. Should it be proposed to send the Bombay steamers to the south, to make their passage the same way as the Calcutta steamers, I say, in reply, that the mails, &c. had better be taken to Trincomalee during that short period, to be forwarded by the Calcutta steamers, thus avoiding the risk of sending two vessels over the same ground, in face of the south-west monsoon, during the prevalence of which the number of passengers from India is much less than at other periods of the year. In the other 8 months, Bombay will possess advantages over Calcutta and Madras, owing to its proximity to Mocha, which will allow of a greater number of trips from and to that place than between it and Calcutta; for be it understood that the Bombay and Calcutta steamers should ply as often as possible between those places and Mocha by which simple plan the Indian government will have only to calculate on taking and carrying the mails to and from Mocha, (instead of Suez,) where they will find mails and passengers from England always in waiting for them. If, however, Bombay could be brought to join the other line at Trincomalee, it would be much more economical in every point of view. I am aware of the difference of opinion on this point at Madras, Bombay and Calcutta, and have therefore to the best of my ability divided the six steamers of 850 tons burthen, giving two of them to Bombay, in case they are determined to pursue their own particular views: this, I think is the most reasonable remedy which your Lordship and the Committee will discover, in endeavouring to find out a plan to please all parties and each presidency. Having thus as briefly, and at the same time as explicitly as in my power, laid before you my own final views and opinions as to the number of steam vessels and their different stations, I now proceed to the next important details (leaving out all minor ones) bearing on the same subject.

"First, as to the depôts for fuel: Mocha should be the grand depôt between all India and Suez, Socotra should also be a depôt; and coals should be sent from England direct to those two places, as also to Bombay, Trincomalee and Calcutta, by way of the Cape of Good Hope; the coals for Suez and the Red Sea above Mocha should be conveyed to Alexandria, and there discharged from the vessel which brings them, into an iron flat boat built expressly for the Nile, and towed by a small steam tug to Cairo, whence they are conveyed in 48 hours on camels' backs to Suez, from which place they can be shipped to Juddah, &c., if wanted, by the native boats of the Red Sea. Conveyed in as above, the coals will cost from the pit's mouth to Suez 3*l*. per ton, and this may in time be reduced to 2*l*. 10*s*. The delivery in tons weight, at the above mentioned ports, of thousand tons of hand-picked dry Welch coal should be contracted for by tender, of course including every item of expense incurred before their safe delivery as above.

"Many will object to sending to Calcutta, when there is plenty of Burdwan coal there. My answer to them is, that that coal is not economical to burn in steamers for long sea voyages, as it is 35 per cent. under quality of Welsh coal, and as it chokes up the flues, from its extra soot and smoke, in half the time that Welsh coal does: therefore Burdwan coal will only do for short stations and local purposes on the rivers and coasts of India.

"In writing the above, I am considering myself as charged with the execution of placing coals, mails, passengers, &c., from Alexandria to Suez, &c. At Mocha, Major Read, or some other officer, being military, should be forthwith as the military resident of the Honourable East India Company, for many reasons. Again, Englishmen (being nautical men) should be fixed at each of the following places; viz., Alexandria, Cairo, Suez, Juddah, and Cosseir, whose duty it would be to act as packet agents at those places. The admiral in India will be the best channel for making the necessary arrangements at Socotra, and he may probably station a small man-of-war there to promote and effect that object.

"My Lord, and Gentlemen of the Committee, be assured that every facility which the ruler of Egypt can afford, will be given to this measure between Alexandria and Mocha, and also that the writer will be alive to every interest that may arise progressively; and be further assured, that after the steam-vessels are properly placed, this steam communication will maintain itself, except the original cost of steam vessels for the purpose from time to time. My Lord and Gentlemen of the Committee, I am convinced that this great and most important object will experience at your hands all the care and research which it requires; I trust also, that in considering these my opinions on the subject, which has ever stood foremost in my mind, the 12 years of devotedness which I have spent in forwarding it will have some weight with you. I now again leave England in debt, if anything nerves me on to pursue this matter with energy, it is the conviction that your Lordship and the Committee will not let my past and present labours in the cause go unheeded, but will hand them over to the House of Commons embodied in your resolutions. At the same time my mind is preyed upon by the consideration that I am suffered to go unrewarded by His Majesty's Government, whose duty it is instantly to remove that want of rank which, in an eastern country like Egypt, so strongly detracts from my better usefulness. My Lord, and Gentlemen of the Committee, I have the honour to remain, with undiminished devotedness to the India steam object,

"Your most humble servant,

"Thomas Waghorn.

"P. S.—My opinions in detail on minor matters connected with the foregoing have been fully detailed to Mr. Secretary Melvill, at the East India House. See also the reference sheet attached.

Thomas W."

EXPLANATORY PLAN.

"I HAVE all along, till to-day, thought that Galle would have been the best place for the final departure of steamers from the coast of India to the Red Sea; but after a most diligent search into that matter, I now find Trincomalee preferable, because it is the naval arsenal of his Majesty's fleet in India; consequently greater facilities can be afforded there than at Galle, at one half the expense: moreover, during peace, the vessels of war under the orders of the admiral on the East India station could be well employed, barring more urgent duties, in carrying mails, &c. On the arrival of the steamer at Trincomalee from Mocha, a vessel of war might sail on with the China mails to Singapore, whence they would be conveyed to Canton by any merchant vessel, and where letters would be found waiting, from Canton, to be conveyed by the vessel of war on its return to Trincomalee. By this means, a much more speedy communication with China is provided than can otherwise be devised, until the merchants of China have themselves steam vessels to Trincomalee, of which I do not despair a few years hence. Again, another vessel of war should from time to time lay at Socotra, whose captain should be our authority there; he could yield great general assistance to the steam vessels there; and it would be a matter of deliberation for the directors of the East India Company, whether their own naval force in India should in time of peace be placed under the orders of the admiral on that station, for this and other purposes.

“ I now beg to offer a few pointed remarks on the tracks which should be followed by steamers navigating between Mocha and the continent of India during the north-east and south-west monsoons.

“ First as to the north-east monsoon. Steamers of the size I have mentioned would go from Trincomalee to Mocha in that monsoon by wind and steam, without a stoppage, easily in 11 days at Mocha they might stop three whole days, thoroughly cleaning their machinery and flues, and taking in coals for the return voyage; then they should return to Trincomalee, on their way to Calcutta, stopping at Socotra for coals on their passage.

“ In the south-west monsoon, steamers should finally leave Trincomalee with only their foremast up, storm fore try-sail sheeted amidships set, and steam away southerly, within four points of the wind and sea, till they get to the line, where they will generally find light winds and calms, and sometimes a fair one; on arrival at the line, they should keep steaming due west, till they find Socotra bear from them N. N. W.; they should then get their mainmast up, and shape away their course directly for it, and they will often, by wind and steam, reach it on the 12th day. From Socotra they could sail all the way back to Calcutta, without steam, touching as before at Trincomalee and Madras. In the northeast monsoon, I expect to hear that the steamers have often sailed, and not steamed, from the continent of India to Socotra.

‘ These vessels should be capable of being changed from steamers to sailing vessels, and *vice versâ*, within six hours, according to circumstances; and if the admiral in India has direction of them, they will be capable of the change in that short space of time, as each steamer should be fitted with a pawle wheel, so that on taking off the six lower paddle-boards, the iron part only would be pawled in the water, which would not impede the vessel in sailing more than one half-knot per hour. Let there be only a good understanding between the governor-general and the admiral, and I will answer for it that the most economical as well as the most useful system for steam intercourse than can be devised will be adopted. Should a mercantile company ever be employed to carry on the communication between Suez and India, that should also be under the orders of the admiral.

Mauritius could receive mails, &c. by the dispatch of a vessel of war, until they have a steamer of their own there; and perhaps 1,000 soldiers, instead of 4,000, would then be deemed sufficient for all military purposes at that island. The saving of expence of 3,000 men thus effected would more than pay for the expense of keeping up two steam vessels instead of one, employed so usefully for all the best interests of that island.

“As soon as this same steam intercourse works well, many of the overgrown military depôts in India will also be pared down. And as, my Lord and Gentlemen, we grow into more sociality with our Indian subjects, there will be no occasion for fear, in a military point of view; for as we improve India, we shall wield the ploughshare instead of the sword.

“ Gratitude from the people of India to happy England will predominate with them, instead of prejudice; and My Lord, in after years, the then East India Company will have cause to exult in the establishment of this the greatest boon that ever was granted by one country to another. This, with other points, tending to make Egypt also a great nation, will flow out of the steam intercourse with India; indeed everything great and advantageous must flow from it to England; Egypt, India and other parts of the eastern world will be raised in the scale of nations, thereby strengthening the political and other influences of great Britain. I have not yet said anything about the winds and weather in the Bay of Bengal; on that I have only to suggest, that the captains of steam vessels should go as near the Coromandel Coast as possible, for smooth water; this applies to both monsoons; as it often blows half a gale in the centre of the bay, whilst it is quite light in-shore; thus, much wear and tear, as well as hazard, is saved to steam vessels.

2. The last time you were in Egypt you had an opportunity of seeing, I believe, a good deal of the Red Sea, had you not?—Yes.

3. What opportunity had you?—Repeatedly being on it.

4. Between what place?—I have been between Suez and Cosseir, carrying mails myself; and altogether I have been five times up and down the Red Sea.

5. To Mocha?—To Mocha.

6. What is the distance between Suez and Mocha, and Cosseir and Mocha, do you remember?—The distance between Mocha and Suez is 1,040 miles.

7. And Cosseir?—Cosseir 260 miles less.

8. And what difficulties are there in going?—There are no difficulties whatever for steam navigation during every month of the year.

9. You are supposing in the Red Sea?—In the Red Sea.

10. Between Mocha and Suez?—Between Mocha and Suez there is no difficulty in steam navigation.

11. What is the prevailing wind?—The prevailing winds are north, during 11 months of the year.

12. And between Suez and Cosseir, for what length of time are the prevailing winds?—Nine months in the year between Suez and Juddah; in fact, northerly winds generally prevail in the Red Sea.

13. During any part of that period do those northerly winds blow with very great violence?—Occasionally they blow with violence, when the sun shines the hottest; it applies to that season of the year when the sun has most power; they get up as the sun rises, and go down as the sun goes down.

14. Will the steamers make against that?—They will make most way at night.

15. Can they make way in the day, when the wind blows with this particular violence?—It never blows with such violence as that a steam vessel cannot go against it.

16. Sir *J. C. Hobhouse.*] When you speak of a steam vessel, you mean a steam vessel of a certain size?—I am speaking of a vessel built for the purpose, of 550 tons, or something of that size

17. *Chairman.*] There are no gales in the Red Sea, are there?—There are gales occasionally, but very trifling, for a very short duration.

18. Is that north wind in the Red Sea equal to the south-west monsoon at its greatest height?—No, it is not half so bad, because the south-west monsoon blows strong for a week together, and the gales in the Red Sea are never known to blow above two days or three.

19. Sir *J. Graham.*] Is there much swell?—The sea soon goes up, and soon goes down: perhaps sooner than in any other part.

20. The north wind prevailing for 11 months in the year, what difference would there be during those 11 months in a passage between Suez and Mocha, with the wind favourable, and from Mocha to Suez?—In speaking of the 11 months, that 11 months was between Suez and Mocha, and then nine months between Suez and Mocha, and then nine months between there and Juddah.

21. What would be the difference in the passage southward from Suez to Mocha, as compared with the passage northward from Mocha to Suez; what would be the difference in point of time?—There would be a day and half difference on the average.

22. Not more?—Never more.

23. Lord *Sandon.*] There would be a greater consumption of fuel, of course?—Coming up, the steam vessels would often sail from Suez down to Juddah, and very likely to Mocha.

24. Sir *J. Graham.*] Both the shores are shoals, are they not?—It is an iron-bound coast, and a steam vessel should never approach the shore when she can avoid it.

25. There are shoals on both sides, are there not?—Yes.

26. The said channel is the only course for safety?—It is a fair good channel for the British navy.

27. What may be the width of that channel?—From 100 miles down to two miles; it is only two miles a short distance through the Straits of Jubo.

28. Has that sea been accurately surveyed?—As accurately surveyed as it can be.

29. Are there any dangers in the mid-channel?—No dangers but what are known in the mid-channel.

30. Which is the last survey of the Red Sea?—The one just now made.

31. In the fair course between Suez and Mocha for a steam vessel are there many dangers, are they numerous?—The only part of the Red Sea that she could not go through at night with safety, is a small part called the Straits of Jubo; and if it was not a dark night, she could go through there.

32. Excepting those Straits that you have mentioned, the rest of the channel may be considered a channel from 80 to 100 miles wide, at deep water?—Yes

33. And safe at night for steamers running?—And safe at night for steam vessels of any size

34. Lord *Sandon.*] Has the Hugh Lindsay ever made a passage against the north wind?—Often.

35. Sir *J. Graham.*] And the difference has not been greater than what you have mentioned between the north and south voyage?—We find they are generally two days less going down to Mocha than up to Mocha.

36. Lord *Sandon.*] And you do not consider the Hugh Lindsay the best calculated steam vessel for that navigation, do you?—I think she is the worst steam vessel.

37. Sir *J. Graham.*] What is her horse-power?—The Hugh Lindsay was built in 1829

38. What is her horse power?—She has two 80-horse power.

39. And what is her draught when full of coal?—I should say it would be 15 feet of water; but they build vessels now, to carry the same burthen she carries, drawing only 10 feet.

40. Mr *S. Herbert.*] And how many days is she going from Suez to Mocha?—About seven days; a good steamer should do it in five.

41. Mr. *Mullins.*] Are there no greater difficulties between Suez and Cosseir than between Cosseir and Mocha?—There are no greater difficulties, though it requires a little more care, as I said before, in going through the Straits of Jubo.

42. Those are the only difficulties?—The only ones.

43 Sir. *T. Trowbridge.*] Is it a regular tide?—No; the current changes with the wind.

44. Sir *J. Graham.*] When you recommend two steamers for the actual duty between Mocha and Suez, and one in reserve, how frequently do you contemplate the voyage being made?—They will go, taking mails down from England, every 15 days.

45. The two in actual employment, and the one in reserve?—They will do it easily every 15 days.

46. Now in case of accident occurring to any of those three steamers, to their machinery, where is the repair to be made?—If ever Trincomalee is established as the grand depôt for steam vessels, there should be a station at that place for steam vessels, and a steam vessel in the Red Sea that was partly worn out might take the mail on to Trincomalee, and return upon such occasions, carrying the mail, to take her place against.

47 Sir *J. Hobhouse.*] From what place?—Suppose we say a steamer in the Red Sea wanted repair, if she comes up to Suez, we can send engineers to repair her; but if she wants new boilers, we will take the mail all the way from Suez to Trincomalee, and she can have her new boilers, and then take the mail back instead of the proper steamer coming; they may change places.

48. Sir *J. Graham.*] If a steamer making the weather passage, and struggling against the northern wind, break down on her voyage to Suez, where would the repair be made to the machinery?—At Mocha. At Mocha sometimes there would be three or four steam vessels together, and if a job wanted to be done to these three or four steam vessels, the engineer would do it himself.

49. Adopting your general plan, at how many places would you contemplate the necessity of having an establishment for the repair of steam-engine machinery?—At Trincomalee, and no other place.

50. Not at Mocha?—Not at Mocha, not at Suez; anything wanting to be done can be sent from Cosseir to be done; I should have them all look to Trincomalee, take a mail when likely to break down, and so have her repaired in time; it would be easy for the captain to write to the admiral, saying she wanted repairs.

51. Mr. *Mullins.*] Have you ever considered whether it would be advisable to have an establishment at the Island of Cameron?—It is altogether useless; there is a bar which prevents ships of large draught going to it.

52. Are you aware of the opinions that have been given on that subject by the officer who commanded in the late survey?—I am aware, I believe, of the general opinions upon steam matters, for I read them all; but there is no facility at Cameron, and I cannot imagine why Cameron has been thought of; there is not a boat on the place, and hardly the means of living; the people live on the fish they catch; the place does not produce dates enough to maintain its own starving population; Mocha is a place containing 40,000 people; Mocha is the place for everything; you must take places where there are facilities.

53. Sir *J. Graham.*] Are there scientific engineers at Cairo?—There are; they repair the Pacha's steam machinery; he has got English engineers on board his steam vessels, and English engineers in charge of his factory; I could send Mr. Hill, and other men of science, at an hour's notice, from Cairo, to repair the vessels at Suez.

54. Though in the first instance the Pacha might give every facility for the establishment of this intercourse through his territories, if at any time he became hostile to it, and imposed a condition, he would be master of that communication, would he not?—I have heard him express himself that he would never oppose the English Government in anything.

55. But if he changed that intention, would he not be entire master of everything?—I do not think such a thing is ever likely to happen.

56. Any ruler of Egypt who changed his disposition might put a stop to it, might he not?—The Pacha clearly perceives it is to his interest to support this kind of thing; therefore, he is the last man, or those who follow after him, who would be likely to throw any impediments in the way of this.

57. There would be a strong feeling both at Suez and Alexandria upon the subject?—In all the ports over Egypt.

58. The large expenses consequent upon travelling would recommend to the people of that country this channel of communication?—It has that effect already; there were 150 passengers passed through Egypt last year, who spent a great deal of money in horses, camels, and journeys to the desert, and in fact they were spending a great deal of money.

59. Have you reason to think they will be satisfied with that indirect advantage, and that a tribute will not be exacted?—There will be no tribute exacted; you are as free as you are here.

60. No port dues either at Alexandria or Suez?—No such thing is heard of as taxes there, except the grant tax of everything—the Pacha: but I pay no taxes, I have a house at Cairo; and there are no port dues at the entrance to the Red Sea, and no expenses of any sort

61. No dues of any kind exacted at either port?—No; I do not think the Pacha would ever dream of putting on dues at either place.

62—3. Mr. *S. Herbert.*] You can have no security that dues will not be made?—I think, if a valuable cargo passes through Egypt, the Pacha will put a transit duty, the same as we do here through a turnpike gate on a good made road; the Pacha, in putting this transit duty, insures it; he is to answer for it; and he is answerable from the time it leaves the country to the time it gets there, and merchants would be glad to pay the transit duty.

64. Sir *James Graham.*] Is the communication between Alexandria and Suez perfectly secure?—With respect to the transit duty, I have two or three times spoken to the Pacha about it; and I have said, whenever your highness does tax it, you must tax it low, and I think half per cent. will be enough.

65. But from the question of taxation by the government, is there security as relates to banditti or robbers?—I can find anything that is lost or mislaid, from Alexandria to Mocha, and I insure every passenger's luggage now who has luggage; there is no such thing as any thing being lost or stolen in Egypt; because if they steal it, they must be found out, they do not require such articles for themselves, and they cannot dispose of them, therefore there is no inducement to steal, if a passenger was to drop his luggage, it would be brought to the English consul at Cairo, and if not brought, a messenger would be sent out by the Pacha, who would very soon recover it.

66. Is money valueless in Egypt?—Money is very valuable

67. *Chairman.*] Are there no bands of robbers in that part at all?—No; wherever the Pacha's rule extends, robbery is put down.

68. Mr. *Mullins.*] Have you not been just stating, as well between Cairo and Cosseir as between Cairo and Suez?—Between all places under the Pacha's rule.

69. Both those places are of course under his rule?—I am not speaking of Syria.

70. Sir *James Graham.*] As to the security of Mocha, do your observations extend there?—That is under the Pacha's rule.

71. The imposts at Mocha are no greater than at Suez or Alexandria?—There are no duties at Mocha at all, except for the native vessels; the English flag exempts vessels from paying duty.

72. Might not that evasion lead to some new regulation of necessity?—I think not.

73. Is it not a complete sacrifice of all revenue, the extension of that immunity?—The principal things that those ships bring to the Red Sea are pilgrims, and those pilgrims that come not under the British flag pay the tax, and therefore that is the reason why those ships have changed their colours.

74. And if that immunity becomes general, and the use of the English flag universal, the tax on pilgrims will cease?—It is an illegal tax, the tax on pilgrims.

75. Sir *John Hobhouse.*] How do you mean illegal?—The pilgrims themselves bear the right of the Turkish authorities at Juddah to tax them; and it was only laid on two years ago, by the governor of Juddah, that is, the Pacha; there is nothing English that is taxed; I may go on to say, I believe, it is a religious tax for some repairs of the holy building.

76. *Chairman.*] What is the average width of the passage between the Straits of Jubo and Suez?—At Suez, of course, the sea ends, and comes to a point.

77. Between Suez and Jubo, what is the average width of the passage?—It gradually gets larger till the channel comes to about 22 miles.

78. Is there any strong current down the Red Sea?—Sometimes there are trifling currents in the Red Sea, but no currents at any time that can be called strong ones.

79. Mr. *Mullins.*] Do you mean to assert that there is no greater difficulty in steaming at the upper part of the Red Sea, between Jubo and Suez, than in the southern parts, in consequence of the force of the current?—No difficulty whatever in the Red Sea respecting currents.

80. I thought you said, this moment, that there were, in the upper part?—I was asked the breath of the passage, not the currents; I said they were trifling currents.

81. Does not the wind blow with greater force between Suez and the Straits of Jubo and Cossier, than between Cossier and the southern parts of the Red Sea?—It does not blow with greater force; the very fact of the "Hugh Lindsay" having been nine times up and down the Red Sea without any physical difficulty, is enough of itself, without entering into any further inquiry about the Red Sea; my own opinion is that Mocha is the best place that can be found in the Red Sea, and the only depôt required.

12. Lord *Sandon.*] Are you well acquinted with Cameron?—I am.

13. You have been there?—Yes, dozens of times; I am now going to illustrate why Cameron is not a proper place.

14. *Chairman.*] I think you had better come and look at the chart?—I know the chart without looking at it; I know Cameron very well.

15. Sir *T. Trowbridge.*] You have stated already that it is good for nothing?—Yes.

16. *Chairman.*] How many feet of water are there on the bar?—Fourteen feet; and I have known three of the Pacha's ships wind-bound for three weeks there, with an expedition on board; they could not get over that bar to Mocha; the sea on it made the water less, and when it was still there was water enough to go over; there is 14 feet of water, and that is sometimes reduced to 12.

17. Sir. *T. Trowbridge.*] Are those soundings in feet or fathoms?—Generally in fathoms; there are breakers close to it; there are some places in the Red Sea where I have known a vessel's stern to be 60 fathoms, and her bow on the shore.

18. Sir *J. Graham.*] Does that apply to the mid channel?—No; I am speaking of the great depth of water; there is no place in the world where the water becomes so deep or a shoal so soon, it is like a stone wall.

19. Sir *T. Trowbridge.*] Is there only one entrance to Cameron?—There are two entrances to Cameron.

90. Is not the second more easy than the other?—The second entrance may be more easy, but you will have to go a very tortuous round.

91. Sir. *J. Graham.*] How often have you been there?—Eight or ten times.

92. And staid there some time?—The reason why Cameron has been thought of, perhaps, is on account of the good water there is there.

93. How long have you ever staid there at one time?—I have been there three or four days.

94. And have you always seen breakers on the bar?—Not always; the breakers get up with the sea.

95. Are you quite sure there is a bar?—There is a bar; the thing is illustrated by the Pacha's ships waiting for water to go over.

96. Have you ever sounded?—You do not require to sound in the Red Sea by daylight at all.

97. Have you ever sounded on the bar at Cameron?—I have never sounded on the bar, there was no occasion for it.

98. Then you do not know what the depth of water on the bar is? I do know the depth of water by general report; and in fact, when I have been going over it, I have looked over the side and seen the depth; you can always see the depth.

99. Does the bar extend across the entrance entirely?—Completely across.

100. Mr. *Mullins.*] Do you mean to assert there is no channel, not even a narrow one?—There is a channel, but it is not more than 12 feet, if that can be called one.

101. Sir *T. Trowbridge.*] What is the rise and fall of water?—Two feet; a vessel would have to wait, as the Pacha's ships did, till the water subsided to allow them to go over the bar.

102. Lord *Sandon.*] Is there good water at Mocha?—Not very good water.

103. Is there an abundance for the use of steam vessels?—An abundance for everything.

104. Mr. *Mullins.*] How many days does it take to go from Mocha to Socotra?—Three days, sometimes four.

105. Mr. *S. Herbert.*] Is not Socotra a very unhealthy place?—Is it said so; it was so at one time; we have at times had unhealthy seasons in England, and you might as well say England, was unhealthy, on account of the influenza which prevailed here a short time ago.

106. Sir. *J. Hobhouse.*] Then you do not mean to say that it is an unhealthy place?—No; and when a man-of-war has laid up there six weeks, they tell it is not; if our ships of war were to leave the East Indies because it was unhealthy, it would not be thought that they were acting very right, I imagine.

107 *Chairman.*] Respecting the traffic, have you ever heard an opinion expressed by the merchants in Egypt respecting the probable traffic that will grow up in consequence of the establishment of a regular steam communication with India?—It would be great indeed.

108. I am not asking what is your opinion, but have you heard what is their opinion upon the subject?—Yes; and they are all watching and expecting the thing at Mocha, and expect to derive very great advantage from steam intercourse.

109. Sir *J. Graham.*] What is the traffic anticipated?—Everything, from the coast of Africa; all will come to Mocha, if it can find a market.

110. What do they expect to send to India. and what do they expect to receive from India?—Elephants' teeth, gold dust [illegible]; half the gums that are called Arabian gums are not so, they are African gums.

111. Is this what they will send to India?—It is.

112. I would ask, would they send, in the natural course of trade, elephants' teeth from Mocha to India?—They would send them to Egypt.

113. From Mocha to Suez; I was asking you whether they would send from Mocha to India, and what they would withdraw from India to Mocha, in this anticipated trade?—I am not merchant enough to go into those points; I can only say that there would be a tremendous collection of African goods, which would find a ready market through Egypt.

114. Do they use opium at Mocha?—Scarcely any; all the Turkish opium will go on the steamers to India; I have already had letters from Paris, from persons asking me where they were to write to send their Cashmere shawls, and other articles of value, by that route.

115. By Mocha? By that road, and so through Egypt, Marseilles can receive valuable articles from Bombay in 30 days; Cashmere shawls in large chests, worth 20,000*l.*, or 30,000*l.*, or 40,000*l.*, in 30 days: who dreams that they would go round by the Cape of Good Hope?

116. *Chairman.*] Have you considered that articles from France would go?—Yes.

117. Is that the opinion of the merchants in Alexandria?—A great house at Paris have written to me to say, that they have written to their Bombay agents to send their Cashmere shawls by that route.

118. Will anything go from France by steamers?—Everything will go by steam vessels; all the printed papers of a valuable description, all books in which the gain of time is a profit, will go; even book packages from London will find their way through France by the deligence. The French steamers carry a pennant, and they take every thing.

119. Sir *J. Graham.*] Will France be content that we should be the carriers from India to Alexandria, and to charge our profit upon so carrying?—The French will make their own charges through France: they make their own charges by their steam vessels, and it is a source of great profit to them. I question very much the expediency of allowing the French steam vessels to get all this great income which must arise from carrying from Marseilles to Egypt, and I think it will in due time be a strong point for the English Government to consider, whether they will not have their own steam vessels between Marseilles and Alexandria; there is no difficulty in it than there would be in the French having their steam vessels at Bombay to carry their passengers to Calcutta.

120. Does France import direct from India?—Yes, great quantities of indigo, in their own ships

121 Mr. *Bagshaw.*] You know, Mr. Waghorn, indigo goes entirely from Calcutta to France?—I know it does

122. Will you tell me what the rate of freight is by way of the Cape of Good Hope?—Now, the rate of freight for indigo is 7*l.* a ton.

123 Now tell me what is the insurance by way of the Cape of Good Hope; two and-a-half per cent., is it not?—I do not know about insurances. I am not a mercantile man.

124. How much would the freight be from Calcutta by steamers up the Red Sea, then to be carried on camels across the desert to Cairo, then to Alexandria, and then transhipment, with the Pacha's transit duty, and then carried from Alexandria to Marseilles; combine all these, and tell me whether you think it at all probable that any indigo will go by that route?—I will explain to the Committee how it will, and I think that I shall carry conviction to all, and that you will be all satisfied it will; there are three months of the year when sailing vessels can go from Calcutta to Suez in 30 days, with ease.

125 Sir *J. Hobhouse.*] Which months are they?—From the 10th of October to the three following months; that is, in 30 days; they can go in five days down to Alexandria, and in ten days more they are in France; the gain of time upon that indigo will, in my opinion, cause it to have a command in the market when it is particularly high, and letters will go out sometimes directing things to be sent by that route; it would be matter of mercantile calculation.

126. Mr. *S. Herbert.*] I ask you what the cost will be; can you calculate the cost of indigo, the conveyance of indigo from Calcutta; can you calculate the charge?—My opinion is that although the charge would be a little more by the route of Egypt, still that would be more then compensated for by the gain of time; there are certain articles, coffee for instance, going a short distance, would command a greater value in the market, than going a longer distance, because it arrives in a more marketable state, there is more essence in it.

127. Mr. *Bagshaw.*] The age of coffee constitutes its better quality, you know?—It does, that is the fact.

128. Sir *James Graham.*] When you say you expect, after the first commencement of the establishment of the packets, and the prime cost it incurred, that the profits on it will defray the annual charges, does that estimate rest on the supposition that indigo and other commodities will pass by this channel from France to India, or is your estimate is formed with reference to passengers only, and without regard to goods?—By estimate is formed in this way, that everything that will pay by the cwt., instead of the ton, will go by steam vessels, which steam vessels, in that navigation, should set apart from 40 to 50 tons for cargo; vessels that carry mails in England set apart so much for carrying cargo, to make them pay, and we have only to follow the same course to make the Red Sea line pay.

129. What should you include in those articles, besides coffee, indigo, and shawls?—Silks from China, China toys, pearls, opium, and many other valuable articles will go by this route; of this I am positive and sure.

130. Your estimate is formed on that basis?—My estimate is formed on allowing a certain portion of the ship, 30 or 40 tons, to be set apart for carrying valuable cargoes.

131. Mr. *Mullins.*] Would you suppose a vessel of the tonnage of 550 tons, could reserve so large a portion as 40 tons for the purpose of carrying a cargo; looking to the larger quantity of coal she must take?—She could set apart 50 tons for the purpose.

132. Sir *John Hobhouse.*] Has the Hugh Lindsay ever carried any cargo?—None.

133. Are you aware how many voyages the Hugh Lindsay has made in the Red Sea?—Eight or nine.

134. Mr. *Bagshaw.*] You were speaking in high terms of the French steamers in the Mediterranean, and of the route from Marseilles to Alexandria; I am afraid you did not tell the Committee the days of quarantine the passengers would be subject to?—There again, upon the French line, there is a better arrangement than upon our own; these French packets have quarantine officers, and by having

quarantine officers, they see that they do not break such and such regulations; they count their quarantine from the time they leave the port, we do not count it till we arrive.

135. In one of the packets sailing from Alexandria to Marseilles in the usual period taken up with such a voyage, still the passengers would have to undergo a great length of quarantine at Marseilles?—They would have to perform the same quarantine that they do at Malta: but it is my opinion that before this day three months the quarantine at Marseilles will be less than it is now; I know from authority it is very likely to happen; and one of my principal inquiries at Paris, as I go along, will be, when it will happen.

136. But an English steam packet, that should sail from Alexandria to Falmouth, on arriving at Falmouth, the period for quarantine would have expired, and the passengers would not have to undergo any quarantine there I presume?—When Egypt becomes a healthy country, (which it will soon, from the excellent salutary laws of the Pacha, who is the first Mahometan ruler that has established such salutary laws,) vessels will then leave Egypt with clean bills of health, and there would be no necessity for quarantine at all; if there was a clean bill of health given to-morrow, there would be no quarantine.

137. Would you not recommend, in any establishment of steam communication between Egypt and India, that it should be done by one establishment throughout?—I know of no establishment capable of doing it the whole way; for instance, I went to Liverpool, five or six years ago, to inquire into that matter; they said we will do everything you like on this side, but in India that must be done by them and I think you will not find that parties, unless they are trebly paid for it, will do the thing the whole way as it is wished; it would be an excellent arrangement, but I do not see how it is to be arrived at.

138. I am only supposing, provided Government were to undertake the steam communication upon a very comprehensive plan, between Great Britain and all the ports of India, should you not think it would be much better it should be undertaken direct from Falmouth, than to commence from Suez?—I would beg to remark on the communication by way of France, and by way of Falmouth; in the first place, the mails leaving London the 1st of last month, will arrive at Alexandria about the 26th, in 26 days, and they take two days to go to Falmouth; letters written upon the 6th in London, will arrive at Alexandria two or three days before them.

139. That is, as far as letters are concerned; but you would not confine your communication to correspondents, I presume?—I think I would fix it at first for mail passengers, and a certain quantity of valuable cargo.

140. Now, in speaking of the navigation of the Red Sea, I think I understood you to say, that a vessel should go from Suez to Mocha every 15 days?—Yes.

141. Now, what would be the use of that, seeing you are only to have a communication from Mocha to India?—We have at this moment opportunities of writing to India every day in the week except Sundays; letters so written go to Marseilles, and every 10th day they go to Egypt: and I mean to send them on from Egypt every 10th day to Mocha, until steam is established for the purpose.

142. Sir *J. C. Hobhouse*.] You are talking, of course, of private letters?—Yes

143. Lord *Sandon*.] What would be the advantage of reaching Mocha more frequently?—Because, by this means, letters would arrive in India in 43 days.

144. Mr. *Bagshaw*.] I beg to ask whether the mail of 1st July, 1836, arrived in Bombay on the 1st August, how was that carried from Mocha?—I took that mail myself from Alexandria to Mocha; I arrived at Mocha at seven in the evening; a ship was sailing next morning at daylight, called the Discovery, which took it to Bombay; and thus this mail went by one of these chance occasions.

145. Sir *J. Graham*.] And those occasions are so frequent, as to render it worth while to establish this mode of conveyance, in your opinion?—The chance communications are confined from May to the 25th August.

146. Mr. *Bagshaw*.] What became of the mails of last August, September, October, and November, as far as you heard?—The August mail, in the first instance, was detained one month at Malta, and eventually came on to Gibraltar, with the next month's mail, of September; those two mails were put on board the Honourable Company's vessel of war, the Euphrates, at Suez, which took them to Mocha, and the captain of that ship can best explain why he left them there.

147. The mails of those four months, I believe, were very numerous, and cost an immensity of money to the merchants; the mails of August, September, October, and November?—It cannot be denied that there has been a great neglect at Mocha, in not having those mails taken on; this neglect is so evident to the parties concerned, that it is not likely ever to occur again.

148. Sir *J. Graham*.] There is now no resident agent at Mocha, I believe?—None but native agents; and if there had been a resident agent, the mails would not have remained there; they would have hired boats. It is the want of authorities that is felt.

149. If I understand you, you propose that there should be nine steamers on the other side of the isthmus?—Seven employed.

150. And you propose that there should be resident agents?—Packet agents; so that, supposing there was anything wrong, the people would go to the mail packet agent for information; you must have one man at the place to correspond with.

151. To give effect to that plan, is it not necessary there should be one central authority? It is.

152. Is the navel authority in that quarter the natural authority; the admiral in command?—He has nothing whatever to do with the Red Sea; our ships of war never enter it, and have not done so since the last expedition to Mocha, in 1823.

153. If other impediments were removed, do you see any obstacle to placing the whole of that establishment under the control and responsibility of the admiral at the East India station, south of the isthmus?—I think it will be a saving to a very large amount, whenever it is done, and one of the most efficient things that could be done.

154. Must not the superintendents, both at Mocha and Socotra and Trincomalee, be naval men?—I would have a military man at Mocha, because the Turkish authorities think a great deal more of military authority then they do of naval authority; but, at all the other places, except Mocha, I would have naval authority; for instance, the authority at Socotra is the captain of the men-of-war lying there from time to time.

155. You would look rather to a King's officer having a controlling power over this large establishblishment in the southern sea, than to an officer in the East India Company's service !—Yes ; whether done by a mercantile company or not, it should be done under the orders of the Admiralty, because they possess resources that nobody else does.

156. Might not the stores for the use of the King's ships in that sea be brought at a smaller cost in aid of the steam establishment, than similar stores could be withdrawn from any other quarter?—Decidedly.

157. Mr. *Bayshaw.*] Did you see the two steamers that went out to India ?—Yes ; there is one thing I would beg to remark upon the Committee ; there is this trifling alteration I would suggest in the present plan that is just put in progress by the East India Company, that instead of employing the Atalenta and Berenice both between Mocha and Bombay, one of them should ply between Calcutta and Mocha, and then you will arrive at practical facts, which you can carry into effect some 12 or 15 months hence ; as to winds ; and weather, and things which are made now matters of doubt, for instance, the south-west monsoon, it will show what time a vessel will be in getting to Calcutta during the time that lasts.

158. Sir *J. Graham.*] On account of the monsoon, which according to your evidence, will stop the communication for four months in the year between Mocha and Bombay, do I misunderstand you when I infer you incline to the opinion that the communication with Bombay should at all times take place through Trincomalee, rather than for eight months direct from Mocha to Bombay?—I have specially stated here it should go eight months direct though Bombay and Mocha, and the other four months it should go down to Calcutta alone through Trincomalee.

159. For eight months you would have it direct to Mocha ?—Yes.

160. And for the four months of the monsoon, you would have it indirect through Trincomalee ?—Yes, to prevent the great wear and tear of the steam vessels.

161. Lord *Sandon.*] The difference in point of time would be about a couple of days, would it not, between Bombay and Mocha, as going direct and going round by Trincomalee ?—The difference is this, that the Calcutta steamer would have started two days before from Calcutta with her mail for Trincomalee, and the Bombay steamer two days afterwards.

162. You recommend a circuitous route for certain months in the year ; what would be the difference, between taking the circuitous route and saving the circuitous route, in point of time ?—There would be no difference whatever, because at this time of the year, you could not get from Bombay to Socotra against the wind and weather.

163. Sir *J. Graham.*] What is the difference in those months that you are able to go direct from Bombay to Mocha ; how many days would it take to go direct, and how many days to go by the circuitous route ; what are the eight months you would go from Bombay to Mocha direct ?—From the 15th of September to the 15th of May, I would go direct from Bombay to Mocha.

164. How many days would it take you ?—That is according to the time of the year, sometimes it will take 12 days, and sometimes it will take 10 days.

165. Mr. *R Gordon.*] Then it will average from 10 to 15 days ?—It will average 12 days.

166. Supposing you continue the same route from the 15th of May to the 15th of September, during the monsoon, how many days will it take you going direct against the monsoon ?—Probably 18.

167. Now during those months, instead of going direct against the monsoon, suppose you go round to Trincomalee, and so to Mocha, how many days will it take you ?—About two days less than going to Bombay straight.

168. Mr. *Mullins.*] When you speak of 18 days, you do not take into consideration the power of the vessels, because different vessels must do it in a longer or a shorter time ?—I have been in a steam vessel at sea in a gale of wind, where power was useless, because we should have gone down head first ; in this case it was in His Majesty's steam-ship Fire Fly, in a gale of wind in the Bay of Biscay.

169. What was the horse power ?—This was three years ago, at which time she was the crack vessel in the navy for speed.

170. What was the horse power ?—Two seventy's.

171. And her tonnage ?—About 600 tons, and this was an instance in which more steam would have been useless.

172. Supposing a vessel of 1,000 tons and 250-horse power were to be used, do you think such a vessel would prove unavailing against the south monsoon ?—I mean to say that if she gets within 10 miles of her voyage, she must turn round and sail all the way back, because she has no port to go to.

173. Do you think it is likely she would fail ?—I think, in a violent monsoon, it is almost certain.

174. *Chairman.*) How often have you been between India and the Red Sea ?—I have been twice. I omitted to state, that as to steamers on the Red Sea, at Suez, there are pilgrims carried by them ; there are persons who have ships of their own to carry pilgrims : there are sometimes enough to sink a vessel.

175. Mr. *Mullins.*) Which would you prefer, vessels of 1,000 tons and 250-horse power, or the vessels you have named, of 550 tons and a proportionate power ?—It depends upon the navigation for which they are wanted ; in some cases I would prefer a vessel of 500 tons.

176. In what cases ?—Suppose I want to go 2,000 miles, or a long distance, by steam, I must have the largest vessel I can get.

177. Mr. *Bayshaw.*) Are you of opinion that no communication with India would answer, except combined with carrying passengers ?—It would not.

178. Sir *J. C. Hobhouse.*] You have made the passage you so recommend for steam vessels often, have you ?—Being employed 12 years as a Bengal pilot enables me to speak confidently upon all nautical points in the statement which I have read.

179. Connected with that passage ?—Connected with that passage, as stated in that written statement.

180. And you have no doubt, from your experience, of the practicability of such a passage being made by steamers, after the manner you have described ?—I am certain they can do it with great ease.

181. Sir. *James Graham.*) Is the communication there contained, as applicable to steam navigation, connected with your nautical experience in this sea ?—Decidedly so.

182. Sir *J. C. Hobhouse.* You are now employed, are you not, by the East India Company and the *King's Government, as superintendent, to assist Colonel Campbell, in Egypt, for the transmission of mails across Egypt?—I have had such an appointment a few hours.*

183. *Have you the least doubt you shall be able to carry into effect the objects of that appointment?* —I am sure I shall.

184. *You have no doubt of it?*—I have no doubt of it.

185. In the performance of the duties which have been assigned to you, do you contemplate that occasionally it may be necessary to make use of sailing vessels instead of steam vessels?—Decidedly so; and the written statement alluded to tells you how the steamers are going to sail, sometimes 15 and sometimes 1,000 miles.

186. And by the employment of sailing vessels in that manner you have no doubt that the transmission of mails will be safely and regularly secured?—In six hours they may be made both sailing and steam vessels.

187. Are you acquainted with the tonnage and steam power o the two steam vessels that have been lately built by the East India Company, the Atalanta and Berenice?—I was in Egypt at the time they were built, and I have made various inquiries about them; I think, when they are made packets instead of armed steamers, they will be very useful.

188. Do you think it would be advisable that one of those vessels should be immediately directed by the governor-general of India to make this passage which you have just talked of, in order to ascertain the practicability of it?—I do and I will go to India for this purpose, and I will ask him to try during the south west monsoon, in the height of it, with one vessel, to try the thing from Calcutta in the height of the monsoon, and I will go all the way to India to induce him to make this trial, and then you will have practical facts to go upon, because you might in a large arrangement be doing and undoing, and it is better to go steadily and surely to work than doing too much in the dark.

189. And you think then, from what you have heard of the power of each of those steam vessels, the Atalanta and the Berenice, when those two vessels shall be converted into packets, and not armed vessels, that the experiment can be made well with either of those vessels?—Decidedly; they are well adapted for the experiment. Many people, not masters of the subject, say that all the difficulty is in the Red Sea; now there is no such difficulty in the Red Sea; the Hugh Lindsay, tub as she is, goes up and down the Red Sea at all seasons of the year.

190. Mr. *S. Herbert.*] You say there have been interruptions during four months between Mocha and Bombay; would there be any interruption between Mocha and Calcutta?—None.

191. Mr. *Bagshaw.*] Have you not had a vote of thanks, accompanied with something equally pleasant to you, conveyed from the merchants of Calcutta, in the shape of a donation for your services in carrying the mails with such expedition over?—I have had a grant of 4,000 rupees from the Calcutta community.

192. And what from the Madras community?—The Calcutta community have given me 7,000 rupees; those gifts were made to me because all those parties knew I was in debt, and rendered so by my continued toils to effect this object, unaided by the East India Company and the Government up to two or three days ago

193. Have not the merchants of London subscribed for the purchase of a piece of plate for a like object, to be given to you?—They have, which is very gratifying to me.

194. Mr. *Mullins.*] Do you know whether any wheel carriages of any description have ever passed between Cairo and Suez?—I know that the Pacha's wife and family have passed over in wheel carriages, and camels draw guns on carts over the deserts constantly.

[Adjourned till Thursday, at Twelve o'clock

Jovis, 15th die Junii, 1837.

MEMBERS PRESENT.

Sir C. Adam,
Mr. Bagshaw.
Mr. D. Barclay.
Lord William Bentinck.
Mr. W. Crawford.
Sir James Graham, Bart.
Mr. Gordon.
Sir J. Hobhouse.
Mr. Hutt.
Mr. Mullins.
Mr. G. F. Young.

LORD WILLIAM BENTINCK, in the Chair.

The Right Hon. Sir John Hobhouse, Bart., a member of the committee, made the following statement

The first thing which was done to carry partially into effect the resolution in the report of the select committee of 1834, was to give directions to the Admiralty to complete the monthly communication of packets in the Mediterranean, by sending a steam packet from Alexandria to Malta. That was in August 1834, almost immediately after the committee had made their report; Lord Ellenborough, when president of the India Board, carried this arrangement into complete effect on February 7th, 1835, and when the present India Board was formed, the president of the Board extended the voyage of the Alexandria steamer by sending [illegible] to Beyrout, and also to the mouths of the Orontes, in order to communicate with Colonel Chesney and the Euphrates expedition.

In order also to carry the same intentions of the committee of 1834 into effect, the Court of Directors, in August 1834, sent a despatch to the Governor General of India, desiring him to send the Hugh Lindsay steamer at stated periods to Suez. The Hugh Lindsay, in consequence of orders given by the Governor General of India, has since that period made four voyages to Suez. I hold a paper in my hand, which mentions at what period those voyages were made, and in what time despatches were consequently conveyed backwards and forwards between England and India.

I should mention also, that in order to co-operate with the Euphrates expedition, and to expedite as much as possible the transmissions of mails between India and England, the Governor of Bombay, and subsequently the home authorities in England, established a dromedary post from Bagdad to Damascus, and from Damascus to Beyrout, on the coast of the Mediterranean.

The consequence of all these arrangements has been, that we have had the great satisfaction of forming a much more rapid communication with India than has ever been known since that great country has been in our possession; in confirmation of which fact, perhaps the committee will permit me to read to them a despatch, dated on the 16th of September 1836, which the home authorities received from the government of Bombay; it is couched in these words: 'We beg leave to offer to your honourable court our congratulations on the rapidity with which your wishes have of late been conveyed to all parts of your Indian possession. The three last overland mails have brought despatches from London to Bombay, in 58 45, and 64, days; and those intended for Calcutta have been forwarded in 10 days. We have witnessed the energetic impulse this early intelligence has given to the mercantile interest, and the unbounded satisfaction it has diffused throughout all classes of the community. It is, indeed, undeniable, that a quick intercharge of information is of the first advantage in commerce, and in the conduct of all public business, while, it is eqally true, that the effect on the minds of those who serve the honourable Company long and faithfully in this distant land, is to deprive the painful feeling of separation from their homes and country of half its bitterness. We beg respectfully to press these reflections on the notice of your honourable Court, with your earnest prayer that you will ere long grant to India the much desired boon of frequent and regular communication with Europe, by the employment of a sufficient number of steam vessels for that purpose.' This despatch, dated the 16th of September 1836, arrived here in the early part of this year.

Whilst the home authorities were thus attempting to carry into effect the resolutions of the committee of 1834, they were at the same time engaged, but more particularly the India Board, to whom that duty was confided by Parliament, in carrying on the Euphrates expedition, to which I need not allude more specifically, because the terms on which this committee is assembled, do not admit of any precise inquiry into that enterprize; but I ought to state, that one of the reasons why more decisive measures were not taken by the home authorities towards carrying into effect other portions of the resolutions of the committee of 1834, was that we considered that so long as the result of the Euphrates expedition was doubtful, and as the Euphrates expedition had been considered the first object to which the Government ought to apply itself, and we should not be justified in taking any decisive steps before we had seen the result of that experiment.

In the meantime, however, a company was formed for the purpose of steam communication with India. The president of the India Board had various communications with gentlemen representing that company, he saw them two or three times at the India Board. He had a correspondence with Major Head, who was then the provisional chairman of that company; also with Mr. Hutt, the member for Hull, who was the permanent chairman of that company, and in consequence of communications with those parties, he at last called upon that company to give to His Majesty's Government, that is to say, to the India Board, a precise proposal with respect to the terms they could offer to the King's Government and to the India Company for a regular communication with India by steam boats.

Considerable delay occurred; the president of the India Board found it extremely difficult to get any positive and precise information from the gentlemen to whom I have alluded. At last, however, a report was sent to the India Board, the title of which was this: 'The report of the committee for promoting Steam Navigation with India.' I hold that paper in my hand and, if the committee please, I will put it in, because it contains what, after the deliberation of many months was thought by very competent persons to be the best offer that the parties concerned could afford to make,—(*The same was delivered in, vide Appendix* (A)].—Upon receiving this report, and giving to it every attention in his power, the president of the India Board communicated with three departments upon the subject; he sent a copy of this report to the treasury; he sent another copy to the admiralty, and he sent another copy to the Court of Directors, and at the same time he communicated personally with the Chancellor of the Exchequer, and recommended that the report should be by the admiralty, or by the lords of the treasury, communicated to the postmaster general. This took place on the 7th of last December.

After some delay, a report was handed to the India Board by the lords of the treasury, prepared under the orders of Lord Lichfield, the postmaster general, by Colonel Maberly. I hold that report in my hand, and if the committee please, will put it in, together with the enclosures, of which I will only read the titles, to convey to the committee a notion of their import. The first enclosure is 'An account of the postage of letters passing through Falmouth by the Mediterranean packet. The next is 'A return of the number and amount of letters and newspapers received by private ships from the Island of Ceylon, and the three presidencies of Bombay, Madras and Calcutta, in the three years ending 5th October 1834, 1835 and 1836.' A return of the number and amount of letters and newspapers sent by private ships to the island of Ceylon, and the three presidencies of Bombay, Madras and Calcutta, in the three years ending 5th October 1834, 1835 and 1836.' 'A return of the number of bags and boxes of despatches sent to and from Ceylon, Bombay, Madras and Calcutta, by private ships in three years ending 5th October 1834, 1835 and 1836. 'A statement of the number and amount of letters landed at the ports in Ireland from the presidencies in India; via. Madras Bombay, Calcutta and Ceylon for one year ended 5th January 1837. *The papers were delivered in vide appendix.*) The general result of Colonel Maberley's examination of the offer that was made by the company to which I have alluded was that it would be highly unadvisable for the India Company, or for the King's Government, or for the post office, to accept the offer made by this company.

A similarly unfavourable, but not a detailed report merely an opinion, was sent to the president of the India Board by the Lords of Admiralty.

An equally unfavourable and decisive answer was sent to the president of the India Board by the Court of Directors.

In consequence, therefore, of those unfavourable reports the president of the India Board thought i there his duty to communicate directly with the Court of Directors his own view upon the subject The Court of Directors, through their secretary, Mr. Melville addressed to Mr. Gordon, the secretary of the India Board a letter, which I hold in my hand, and which I should wish to put in, dated the 1st o February 1837.

Sir,—I have laid before the Court of Directors of the East India Company your letter, dated the 7th December last, requesting that the Board of Commissioners may be furnished with the court's observations of the plan and proposal contained in a report, of which you inclose a copy for the formation of a company to undertake the establishment of steam communication with India.

In reply, I am commanded to state, that 'the court having maturely considered the subject, are of opinion, that in order to ensure efficiency and permanency of steam communication with India, it should be established and maintained by His Majesty's Government and the East India Company; and that on this ground independently of the objections to conferring upon the projected company the right of levying postage, the proposition submitted in the report cannot be entertained; but while such is their opinion upon that proposition, they desire distinctly to state their readiness to concur in the establishment of monthly steam communication with India by the way of the Red Sea, upon the principle which was recommended by the committee of the House of Commons in 1834, and to which they have on former occasions referred, viz. an equal division of the expense between His Majesty's Government and the East India Company.

'The court submit, that the expense, to be thus divided, should be the charge which might be actually incurred for the object to be effected, and as His Majesty's Government have already a packet establishment for other purposes between Falmouth and Malta, the convenience of the India mails to and from Malta would not be attended with any charge on His Majesty's Government. The expense of the necessary establishment beyond that place is, therefore, all that would be incurred on account of India, and consequently all which the East India Company should be called upon to share.

'The court being, however, anxious that the settlement of this question should be no longer delayed, are willing, as His Majesty's Government have extended the packet communication from Malta to Alexandria, to waive the claim which India might possess to a share in the postage which in such case would be received by His Majesty's Government in and from Bombay, instead of as at present, to and from Alexandria.

Should His Majesty's Government consent to this principle as a basis for future proceedings, the court would be prepared to enter upon the necessary arrangements, in framing which it appears to them to be requisite that His Majesty's Government should issue such directions with respect to the mail from Alexandria and Malta for this country, as would obviate the inconvenience which has already resulted from the departure of the packet from Alexandria before the arrival there of the mail from India.

(Signed) 'L Melville.'

This is the letter to which I have before alluded, and which contained the first direct proposal made by the Court of Directors to the president of the India Board in writing. This letter was received on the 2d of February, and 3rd of February the president of the India Board wrote to the Chancellor of the Exchequer a letter which I will take the liberty of reading:

'Sir,—I have the honour to transmit to you, for your consideration, a copy of a letter which this Board has received from the Court of East India Directors, relative to a speedy and regular communication between this country and India, by way of Malta, Alexandria and the Red Sea. My understanding of the proposal herein made to his Majesty's Government is, that the court think they ought to pay no part of the expense of conveyance from England to Alexandria, but they are willing to divide, in equal shares, the expense to be occasioned by transmitting the monthly mails between Alexandria and Bombay.

'They are willing, it appears, in consideration of such arrangement, to leave to the Government the whole profit to be derived from the postage of letters by this route, both to and from India.

'I cannot help thinking that the proposal thus made by the Court of Directors, is exceedingly fair, and I should hope that the additional outlay might, in no very protracted an interval, be provided for by the postage, which the court propose to abandon for the advantage of the public revenue. Begging your early attention to this very important subject.

I have, &c.

(Signed) 'John Hobhouse.'

To the Rt. Hon. the Chancellor of the Exchequer.

The president of the India Board did not receive any precise answer to this communication of the 3d. of February until the 9th of March. The answer that was received at the India Board was as follows

'Sir,—With reference to Sir John Hobhouse's letter dated 3d ultimo, enclosing copy of one from the East India Company, relative to a speedy and regular communication with India, by the way of Malta, Alexandria and the Red Sea, I am commanded by the lords commissioners of his Majesty's treasury to state to you for the information of his Majesty's commissioners for the affairs of India, that my lords concur with the president of the Board of Control in thinking that a speedy and certain communication with India is a matter of so much importance to the whole of the King's subjects, that it is fitting to assist in its attainment by some contribution from the public resources; and their lordships are, therefore, willing to admit the principle stated in the correspondence before them, but they will require more precise and definite information before they can lay the case before Parliament.

(Signed) F. Baring.

To Robert Gordon Esquire.'

On receiving this letter on the 9th of March, the president of the India Board wrote on the 10th to the chairman and deputy chairman of the Court of Directors a letter, which I will also take the liberty to read to the committee

'Gentlemen,—I have the honour to enclose for your perusal a copy of a letter addressed to this Board by the Lords of the Treasury, in reference to the proposal made by the Court of Directors for establishing a regular and speedy communication to and from India.

'You will perceive that their lordships request the commissioners for the Affairs of India and the Court of Directors. to communicate with the Post-office, in order to obtain an estimate of the probable expenses by such may be incurred by the establishment of a line of packets for the required monthly conveyance of the Indian mails, either by the Red Sea or by the Persian Gulf; and I would thank you to inform me what officer of the India House it may be your wish to appoint for the performance of this duty.

And, with this view, I am to request that you will move the commissioners for the Affairs of India to put the proper authorities in communication with the post office department, in order that a more clear and precise plan and estimate may be submitted to this board.' I beg to direct the attention of the committee to this last paragraph of the letter.: Their lordships, of course, assume that the question reserved for their consideration will embrace the communication, by steam, with the three presidencies.

I have also to direct your attention to the concluding paragraph of their lordship's letter, and to state that I entirely concur in the view therein expressed, as I am convinced that any plan which does not embrace a communication by steam packets, with Madras and Calcutta, as well as with Bombay, will entirely fail to give public satisfaction, and to fulfil the just expectations of the people, both of England and of India.

(Signed) 'John Hobhouse.'

'To the Chairman, &c.'

On the 30th of March, an answer, as follows, was addressed by the chairman the president:

Sir,—I have had the honour to receive, and to lay before the Court of Directors of the East India Company, your letter, dated the 10th instant, with its enclosure; and I am requested to express the satisfaction of the court at finding that their proposal, as submitted in the letter from the deputy chairman and myself, dated the 1st ultimo, for establishing a communication from Alexandria to Bombav, by way of the Red Sea, at the joint expense, in equal shares, of His Majesty's Government and the Company, His Majesty's Government being entitled to all the postage to and from that presidency upon letters sent by that route, is acceptable to the lords of the treasury. The court are aware, that it will be necessary to promote, by every possible means, facility and quickness of communication between Bombay and Calcutta, and Madras; and they have observed, by recent intelligence, that the Government of India has adopted arrangements for the acceleration of the dawk, by which packets may be conveyed from Bombay to Calcutta, in from eight to ten days, and to Madras in about seven days, and which the court consider to be a much more rapid and certain, and unquestionably more economical mode of communication than a steam conveyance. The Court submit that the question either of altering the India station for the steam-packets or of establishing a branch communication by steam between Bombay and the other presidencies, should be reserved for consideration, after trial has been fairly made of the plan suggested in their former letter; but they are prepared to authorize the Bombay Government, in the event of the difficulties on the line of the Red Sea in the months of June, July, August and September, being found insuperable, to take such measures, pending the determination of the home authorities upon the subject for forwarding the packets to or from Bombay by the Persian Gulf, as may insure a regular monthly communication. In reference to the desire expressed by the lords of the treasury, that the proper authorities should be put in communication with the Post-office Department, in view to a more clear and precise plan being submittedto their lordships, the Court request me to state that they will instruct their secretary, who is also their financial officer, to confer with any officer who may be named by His Majesty's Government for the purpose, of preparing an estimate of the expense, or of collecting any further information that may be thought necessary.

(Signed) 'James Carnac.'

'Right Hon. Sir John Hobhouse, &c. &c.

On receiving this letter on the 30th of March the president naturally entertained some doubts as to the course which it would be proper to pursue. He had several oral communications with the representatives of the Court of Directors, and from them was given to understand that an effort upon his part to insist at once upon the larger plan being carried into effect would most probably fail, and that by so insisting on an extended plan it was more than probable that no immediate step would be taken towards a steam communication with India, or towards any first experiment of importance. The president considered that by consenting to the modified plan he was in effect conforming to one of the alternatives that was proposed in the 5th resolution of the committee of 1834 that resolution was as follows, 'Resolved. That it is the opinion of this committee that it be left to his Majesty's Government, in conjunction with the East India Company,to consider whether the communication should be in the first instance from Bombay or from Calcutta, or according to the combined view suggested by the Bengal steam committee.' The committee will perceive that in acceding to the modified proposal of the Court of Directors, the president was adopting one of the plans recommended in this resolution. The president thought himself justified in postponing the larger scheme, and he accordingly wrote a letter, on the 3d April, to the Chancellor of the Exchequer, in the following terms:

'Sir,—I beg to transmit to you a copy of a letter received at this Board from the chairman of the East India Company relative to the speedy and regular conveyance of mails between England and India, and I have to remark, that although my own views of the question would induce me to prefer an immediate arrangement for communicating not only with Bombay but with Madras and Calcutta by monthly steam packets, yet, in order to prevent delay in the commencement of so useful an enterprise, I consider it to be advisable to close with the proposal now made by the Court of Directors. I would therefore thank you to inform me (in case the Lords of His Majesty's treasury should coincide with me in the above opinion) with what officer of the Post-office department you would wish the secretary of the

India Company to be placed in communication, in order to make requisite arrangements for carrying into effect the proposed *plan*.

'have &c.
(Signed) J. HOBHOUSE.'

'Right Honorable the Chancellor of the Exchequer, &c. &c. &c.

To that letter, dated the 3d of April, no positive answer was received until the 17th of April, but in the meantime the president had various communications, partly by letter, partly verbal, with all the departments, the admiralty, the treasury, and also with the Court of Directors. On the 17th of April, Mr. Gordon received from Mr. Francis Baring this letter:

'Sir;—With reference to a letter from Sir John Hobhouse of the 3rd instant, inclosing one from the chairman of the East India Company, relative to the conveyance of mails between England and India, I have it in command from the lord commissioners of His Majesty's Treasury to acquaint you, for the commissioners for the affairs of India that my Lords consider that the East India information of the Company should be put into communication with the postmaster-general and the Lords of the Admiralty on the above subject, and they will make the necessary communication with those departments accordingly.

'I am &c
'F. BARING.'

To ROBERT GAROENE, ESQ.

This letter was considered to be an acquiescence in the proposal, and accordingly the Court of Directors were requested to communicate with the Post-Office and to frame an estimate of the expense to be incurred by a monthly communication between Bombay and Suez, by four steamers of 200-horse power each. The estimate was framed and sent to the India Board, and I have been informed that the Post-office department entirely concur in the correctness of it; I hold that document in my hand.

Cost of one steamer complete, 30,000*l*.			
Interest on capital sunk, at 4 per cent. per annum		£ 1,200	£
Insurance on capital sunk at 5 per cent. per annum		15,00	
Annual deterioration by wear and tear, reckoning duration of hull at 15 years, say 6⅔ per cent. on 17,000*l*.	£1,147		
Duration of engines at 10 yrs, and boilers (copper at eight years, or for the remainder of the cost 13,000*l*., say nine per cent.	1,170	2,317	
Annual repairs, say 5 per cent		1,500	
			6,517
Establishment and victualling			5,000
Coals, assuming three voyages per annum from Bombay to Suez, each voyage to occupy 40 days in steaming, and the consumption of coals to be 18 tons a day: in this view the quantity required will be tons.	2,160		
Allow for wastage, &c. about 20 per cent	440		
	2,600		
Expense of one fourth of that quantity at Bombay, viz. 650 tons at 45s. per ton		1,462	
Expense of three fourths in the Red Sea, viz. 1,950 at 80s per ton		7,800	
Expense of transhipping coals, &c.		1,221	10,483
			22.000
Or for four steamers per annum			£ 88,000

The following note is appended to the estimate: 'In the foregoing view, it assumed that the steamers are to be constructed at Bombay, where timber and other materials are stated to be reduced 50 per cent. compared with the prices of the year 1829, when the Hugh Lindsay was built.

That the hull, &c. will cost	£17,000
And the engines, copper boilers and machinery	13,000
	£30,000

'It is also assumed that the value of the old copper boilers and other worn out stores, will cover the freight of new engines, &c. out to Bombay.' I beg leave to put this estimate in which, as far as I understand, is considered to be rather over than what the cost is likely to be.

Sir John Barrow was also requested to give an estimate of the expense of one steam-boat in the Mediterranean; he transmitted this paper:

'Spitfire, 553 tons, and engines of 70 horse power each.

	£.	s.	d.
Wages	1,602	16	8
Victuals, includidg extra allowance of spirits while the steam is up	688	4	0
Coals for 12 trips, reckoning the time of steaming each trip to be 20 days, calculating that the consumption is at the rate of one ton in two hours, and at the last contract piece of coals delivered at Malta and Alexandria	4,624	0	0
Total (exclusive of repairs)	£6914	0	0

'This calculation,' Sir John Barrow says, 'is made for one steamer going each month for one whole year, from Malta to Alexandria, Alexandria to Beyrout, Beyrout to Scandaroon, returning to Alexandria and from Alexandria to Malta.'

Upon receiving these estimates, the president communicated the result to the Chancellor of the Exchequer, and personally had several conversations with him upon the subject; the result of which was that he sent to the president a private letter, stating his consent, and that the lords of the treasury might be considered as acquiescing in the arrangement.

The president communicated this to the Court of Directors, and on the 2d of June the following despatch was sent out to the Governor-General of India in council, I read this despatch, because it in fact tells what has been done, very shortly, and gives the necessary orders to the authorities in India:

'1. We have the satisfaction to acquaint you, that we have concluded in arrangement with His Majesty's Government for the establishment of a monthly steam communication between Great Britain and India, by way of the Red Sea; 2. His Majesty's Government undertake the transmission of the monthly mails between Great Britain and Alexandria at the sole sharge of the public; and we have undertaken the transmission of these mails between Alexandria and Bombay, upon condition that one-half of the expense which we may incur in the purchase, equipment, maintenance and navigation of steam vessels (including the value of any which we may already possess, and which may be applied to this purpose), or on any other account for the service, shall be repaid to us in London, at the termination of each year, we consenting to relinquish to His Majesty's Government the whole of the postage between London and Bombay; 3. It is our desire that this arrangement take effect forthwith, and with that view we shall direct the government of Bombay to send the Hugh Lindsay to Mocha for the purpose of her being regularly employed in conveying the mails between that place and Suez, and to dispatch the Atalanta and Berenice on alternate months to Mocha; 4. We are aware that a fourth steamer will ultimately be necessary, and we shall adopt measures for providing one; 5. We shall immediately contract for the purchase of a large quantity of coals for consignment to Bombay and Mocha respectively; 6. A portion of those sent to Mocha may if necessary, be ultimately conveyed to Suez, but we intended to try the plan of supplying that place with coals, via Alexandria.

This despatch has been sent to the Governor-General of India, a few days before it was determined to send out that despatch, it was thought proper to take into consideration a plan that had been suggested before to the India Board, for the transmission of the Government mails across France to Marseilles, by which plan it was concluded, upon premises which I believe are correct, that a saving, as the committee have heard from the witness, Mr. Waghorn, of from four to six days, and perhaps a little more might be made in the time employed on the whole conveyance.

The president communicated on this subject with the Foreign Office, submitting to Lord Palmerston certain papers drawn up by a gentleman very capable of judging on the subject, who had been for many years a resident at Malta, Mr. Calvert. Lord Palmerston favoured the president with his views on the subject, concurring generally in the expediency of such an arrangement, and consenting that either a Government messenger, or some person empowered to take the India mail, shall, once a month, that is to say, on the 6th of every month, leave England for Marseilles. I should state, at the same time, that his lordship thinks it possible there may be some difficulties with respect to a general Indian mail in sealed bags traversing France, but that he is far from thinking that those difficulties may not be finally removed. I hold in my hand a table showing the organization of the packet service, and the postage of letters so transmitted by the French steamers in the Mediterranean, and the rate of passage per head; it is a translation from a French official document and perhaps it might be useful for the information of the committee. [*The same was dilivered in, vide Appendix.*]

Having mentioned that the Court of Directors had during the interval to which I have alluded, built and sent out two steamers, perhaps it may be as well that I should put in a statement of the size, the horse power, guns, &c, of the two Company's steamers, Atalanta and Berenice. [*The same was delivered in vide Appendix*]. It will be some satisfaction to the committee to know that these two steamers seem likely to answer their objects. The Berenice, in coming up channel, which she did on her way from Scotland proceeded at the rate of eight knots an hour in the face of a strong breeze almost the whole of the way. And the Atalanta ran from Fernando Po to the Cape of Good Hope which is 2,200 miles, in 13 days, without having her copper looked to.

These vessels are now gone out, and in order to make some experiments of the larger plan of communication with the three presidencies by steam, the Governor-General has been instructed, not by a public speech, but he has been recommended to send one of the steamers, either the Atalanta or the Berenice, round from Calcutta to Madras thence to Ceylon, and thence to Socotra and up to the Red Sea to Suez; so that, at least by one trial, we may be able to ascertain practically what objections there may be to that route.

I think that I have detailed to the committee pretty much what has been done by His Majesty's Government and by the Court of Directors, and I have only to say, in conclusion, that I consider that both the Court of Directors and the King's government were justified in making the first experiment to Bombay. I need not tell the gentlemen of the committee, many of whom are so well acquainted with the subject, that it is of great importance there should be a communication even with Bombay; for I totally dissent from what was said by Mr. Waghorn, that he considered that result is 'worse than nothing.' I need inform the committee, that for what may be called government purposes, viz. communications between the home and the local authorities, this scheme answers every object. The communication is as rapid from Bombay to Agra, as it is from Calcutta to Agra; and with reference to the important frontier of the Indus and Sutlege, I have heard that a steam-boat might communicate even with Lodhiana, by an 18 days' passage from Bombay. In fact, to say we have done nothing by establishing this communication with Bombay, is rather the opinion of a partizan than of an impartial observer.

Let me remark, also, in reference to what was stated by Mr. Waghorn, that his services had been overlooked by his Majesty's government, that the present Board of Admiralty have declined to promote him to a lieutenancy, in consequence of certain rules of service which had induced two former Boards of *Admiralty to come to the same conclusion.* At the same time, the King's government have, in conjunction with the Court of Directors shown every disposition to acknowledge the merits of Mr. Waghorn. *The Court of Directors have in the first place, given him a sum of money for his past exertions, and they have, in conjunction with the India Board, now given him the appointment of deputy agent and superintendent of the India mails in Egypt ;* and in compliance with his own request, they have moreover advanced to him one year's salary.

I forgot to refer to that subject which the noble chairman called to our notice previously to my beginning to give my evidence. I allude to the Bombay marine. The committee are aware that for some time, an opinion has been entertained that the Indian navy should be placed under the command, or merged, in fact, in the command of the King's officer in those seas. Such a proposal has been made more than once, but it has hitherto not yet been carried into effect. Since however, the question of steam navigation has been more particularly brought before the attention of the Indian and the Home authorities, a suggestion has been made that perhaps instead of annihilating the Bombay marine altogether, it might be advisable to convert that naval force in to a steam flotilla. Indeed when it was thought fitting to send out the Atalanta and Berenice steamers to India it was resolved by the Home authorities that at the same time a reduction should take place in the Bombay marine so as partially at least to cover the expense of those two steam vessels ; and this substitution has been, and I think very justly, considered as something like the first step towards affecting the object to which I have alluded. Any gentleman who looks at the Indian register will see what the force of the Bombay marine is, and it will there appear that by converting that force into a steam flotilla, it will be very possible, and indeed very easy, to obtain all the objects which we sought for by a more extended plan of communicating with the three presidencies by means of steam.

I should state that although there is no formal proposal now made from the Court of Directors to the India Board, and no positive plan for carrying into effect this object, yet I have good reason to believe, that such a scheme is at this moment entertained by a certain portion of the Court of Directors ; and that it is more than probable,that in a very short time,that proposal will be introduced in a formal manner to the Court itself, and afterwards of course, if it receives the assent of the Court, will be laid before the India Board. I should wish to be understood as saying this only with reference to that portion of the Court of Directors with whom I am in official and weekly communication, but repeat that it is my hope and conviction that this proposal will finally receive the consent of the Court, and that within no long time the Home authorities will be able to communicate to the public and to the Indian Government that it has been altogether decided upon.

Adjourned till Tuesday next, at two o'clock.

Sir J. Hobhouse, Bart.

15th June, 1837.

Jovis, 22o Junii, 1837.

MEMBERS PRESENT.

Mr. Bagshaw,
Lord W. Bentinck,
Mr. Crawford,
Mr. Gordon,
Sir. J. Graham, Bart.
Sir J. Hobhouse, Bart.
Mr. Mullins,
Lord Sandon,
Sir. T. Toubridge, Bart

LORD WILLIAM BENTINCK, in the Chair.

Captain *Alexander Nairne,* called in and examined.

195. *Chairman.* You have been in the East India Company's service ?—I have.

196. What ship did you command, and for how many years were you in the service ? I commanded the General Kydd : I entered the service in 1803.

197. You are very well acquainted with the Indian seas?—Yes ? I have some little knowledge of them.

198.—Have you made several voyages to Bombay and Calcutta ?—I commanded that ship eight voyages.

199. Do you conceive that there is any difficulty in a steamer making a passage up and down the Bay of Bengal in all monsoons ?—I think there is no difficulty at all ; I speak from the experience that I have had with steamers in this country, and if the committee will allow me to give one or two instances, I think it will be more convincing than anything else. About nine years ago I was like most old sailors, very much against steam communication. I was coming from Rotterdam in the Attwood steamer, a very small vessel ; we were obliged to anchor at the Brill, the wind blew so hard ; after a time the weather appeared to be a little better, and the commander got the vessel under weigh ; but when we got on the flats (there is a very long flat sand there, between the buoys,) the vessel hardly went ahead at all, it blew so hard. After remaining in this state, sometime, going very little a-head, he said to the pilot, in an under tone, I was pretty near him. ' We must go back ; the pilot said, ' we cannot go back, the water has fallen,' on which the captain showed a good deal of nerve and said, ' I think the weather is clearing up,' and looked about so as not to alarm anybody, ' and we will go on.' He was in this situation for an hour and a half, and the vessel was literally knocking herself to pieces ; but notwithstanding, when she got the tide in her favour, she gradually crawled out ; it was from that moment that I began to see the power of steam ; that vessel was a vessel of very small power ; I should say that it blew so hard that it would have brought vessels within one reef of being close reefed. But I will sim-

ply mention another instance when coming from Scotland last February in the Clarence; we left Leith roads at once in the afternoon and about midnight it began to blow very hard from the south west; on the following day, when we were within five leagues of Flamborough Head, we came up with a fleet of colliers between 200 and 300; those colliers were under close reefed topsails and foresail, nothing else; their square mainsail furled. This will be better understood by seamen; the colliers do not often take in sail till the very last. When we got to the Head, the wind was directly a-head, and several of the colliers who were a-head of us, were bearing up to take shelter under the Head, and the Clarence at time, I am quite satisfied, never went less than four knots an hour.

Mr. *Mullins.*] What was her tonnage and horse power?—I think she has two eighties: that is the favourite size; they call her 1,000 tons, but I should hardly think she is that; I should think not above 800 or 900.

201. Her usual rating is 1,000 tons?—Yes.

202. Mr. *Crawford.*] Does not the difference of tonnage arise from the peculiar shape of steamers?—Yes; they would not take them as above 700 or 800 tons in other vessels. I have been in various steamers; I have been in the Monarch under almost the same circumstances, about four years ago.

203. *Chairman.*] What was her tonnage?—She is called 1,000 tons also.

204 Do you think the force of that south-west gale was equal to the force of the south-west monsoon which you have seen in India?—Decidedly. I will give a proof; those colliers were under close reefed topsail; in coming out of Bombay harbour in the strength of the south-west monsoon, vessels never exceed the double reef in their topsails, and generally only the single reef; it is rather too much sail to have, but still they prefer to have it to force the ship out, because they must get the offing before the flood tide sets on.

205 In what way would you propose that the passage should be made from the Hoogly to Madras in the south-west monsoon?—I should propose that they went over from the floating light to Point Palmyras, and that side of the bay the wind is generally less strong there on shore, you may get a little more sea, the squalls come from the south-west; but if it blew so very hard that they really could not go across (for the great difficulty will be in going across what they call the reefs from the floating light to Palmyras, are three reefs to cross you may call them two reefs where there is a very high sea,) of it was blowing so hard that you could not get across, it would be a very simple business to keep on the starboard tack, and let them fetch down within the island of ; although it is a lee shore all the way down, you would get into variable winds and smooth water almost as soon as you are withinside of the island of , and that breaks the sea all the way down, and after you get well down the bay you might take sea there, because, it is only in spring tides that it blows very hard, you may stand across for Madras.

206. Mr. *Crawford.*] Then you would get to the southward by south-south-east?—Yes, it is the way that all the East India Company ships go to China; when on the starboard tack, they never think of tacking.

207. What number of days would you estimate a passage under those circumstances to Madras from the mouth of the Hooghly, in such weather as would give you occasion to go to the south eastward?—That requires to be turned in my mind in estimating the difficulties; but I should think that the passage might be made, even under the circumstances that I state in going down, in six or seven days.

208. *Chairman.*] In this mode of making the passage, you do not contemplate going in the face of the south-west monsoon?—This is if you cannot get across to Point Palmyras, if it should be blowing so very hard that you cannot reach that point.

209. Have you often seen such weather that you could not get across to Point Palmyras?—I have never seen it.

210. Mr. *Mullins.*] In those observations which you have just made, are you speaking of sailing vessels?—Yes, I am speaking of sailing vessels, not of steamers.

211. *Chairman.*] Having made for Point Palmyras, would there be any difficulty in going down the coast to Madras?—I should think none.

212. The land and sea breezes prevail all along the coast, do not they?—In the strength of the south-west monsoon, I should say that, unless you are very close in they do not; that is to say, they do not extend far out, but the squalls come from the north-west, and of course that is the leading wind there.

213. How far do the land and sea breezes prevail from the shore?—I am not prepared to say, for I never went down.

214. Have you been at anchor in the Madras roads?—Yes, I have.

215. Do the land and sea breezes prevail there?—Yes; there is one part of the year when there are along shore breezes.

216. Do you know the voyage from Madras to Point de Galle?—No; I have not had experience in that at all, except from hearsay.

217. Do you know that the south west monsoon blows up in the centre of the bay particularly?—Yes, it does.

218. With a powerful steamer, such as you have been in, could you make any way directly in the teeth of that south-west monsoon?—I think powerful steamers would make head against it; but there is a remedy for it; if at any time it did blow so hard, you might go to the southward assisted by canvas, and then you would get into the variable winds, and get up in that way; I presume you are alluding to making the passage to Bombay.

219. Do you think the passage might be made from Bombay direct to Socotra by a steamer in the south-west monsoon?—I think it might.

220. How would you make it?—On leaving Bombay harbour, I would endeavour to go direct for it; if I found we did not get a-head, I would go to the southward. It is a well-known fact, that the south-

west monsoon does not blow strong till you get within 30 or 40 leagues of the coast of Bombay; you have very often very fine weather 30 leagues off, and the instant you get in you have hard squalls and rain. I was in Bombay three years ago, from July to October, and almost every ship that came in I put the question to them as to what kind of weather they had had before they made the land, and I think nine out of ten said that they had fine weather within 40 leagues to 50 leagues off Bombay.

221. How many miles an hour upon the average, do you suppose that a strong steamer would go against a south-west monsoon from Bombay to Socotra?—I think from four to five miles an hour in the strongest. I sailed on the 1st of October, but from the 15th of June to the 15th of August it is the hardest; July and the early part of August is the strongest part of the monsoon.

222. Mr. *Mullins.*] Do you think it would be advisable, in cases where you could go only at three or four knots an hour, to venture the direct passage, looking to the possible injury to the machinery?—I think you would get out of this violent weather by going a little out of the common route; you might angle it so as to bring the wind four points and five points in the hour.

223. Then you think it would be advisable to do so in place of going direct under such circumstances?—If the weather is such, that you are likely to injure your machinery; but from what I have seen of steamers in this country, I should not apprehend any difficulty at all against a monsoon, so hard as I have seen it in India.

224. *Chairman.*] You know that the distance is 1,200 miles?—It is about 1,260. I believe; I ought to mention that I am rather taken at a disadvantage to-day, not being aware that I should be examined or I should have made myself master of the distances.

225. Mr. *Mullins.*] Suppose a vessel were to encounter a strong wind during the entire of her voyage, of that period, between Bombay and Socotra, should you think it advisable to follow the direct route?—No, I would go to the southward.

226. Mr. *Crawford.*] Your direct course is to the westward of the south, and in such weather you would make to the eastward of south?—Yes, I would go on the larboard tack; I would take the coastways first of all; we find no difficulty in the large 1,200 ton ships coming with a cotton cargo, which is a very unfavourable one for a ship against the wind, going down the coast on the larboard tack.

227. Mr. *Crawford.*] But the south-west monsoon is a fair wind when you get out of Bombay harbour, is it not?—Yes, but the wind blows in very hard, winds from west to east; but I would have no hesitation in going down the coast a little, and then branching off immediately.

228. *Chairman.*] You would go so far to the southward till the south-west was a fair wind for you?—Till the wind slackened a little; you never have the wind blowing so hard more than three days on the full and change.

229. How far south would you go; would you go as far as south as Goa?—No, decidedly not; I am saying, if it is blowing hard, and the vessel is going out at the full or change, you do experience then hard squalls from west-south-west, and west-north-west.

230. Sir *J. Graham.*] Have you any experience with regard to the wear and tear of machinery in such a struggle as you have referred to, if protracted for many days?—No, we were 20 hours on the occasion that I referred to; and once in the Monarch 20 hours; but there was not the last appearance of strain on the machinery, or of the vessel; I was quite astonished with the Clarence, the last vessel I was in, last February.

231. Did you make your passage throughout in the wind's eye?—As soon as we got round the Head the wind came to the southward, and it nearly came a-head; every point we came to the wind was directly a-head.

232. Did not they keep several points off the wind?—Never once; they headed it the whole way.

233. They did not keep her away at all?—Not at all; they did not appear to think anything of it; they said it did not blow very hard. I said there are colliers under close reefed topsails. They said it was nothing to what they had had before.

234. What was the sea as compared with the Indian sea?—I should say the sea was quite equal to any sea you will meet with in the Indian sea, when we came round Flamborough Head.

235. Judging from what you then saw, you think that a steamer with equal power could, throughout her course from Bombay to Socotra, make four knots an hour?—I do.

236. As to the wear and tear upon the vessel and the machinery, you have no information resting upon your own experience?—No, I have none; but from what I saw, I should say that there can be but little fear of the machinery.

237. *Chairman.*] And notwithstanding that the voyage is as long as 1,200 miles, you still think that there would be no fear?—I do.

238. Mr. *Mullins.*] You have already mentioned that you would advise a southing?—If the vessel did not go a-head.

239. If she did go a-head ever so slowly, would you recommend her to sail direct?—Yes; I am almost sure that the vessel would go in face of the monsoon at any time; just in getting out of Bombay harbour at the full and change, when it blows hard for two or three days, you would be obliged to go to the southward.

240. Does your experience of steam machinery warrant you in asserting that no damage could arise from continual straining so long a voyage?—I have not experience enough to say completely; but from what I have seen I should think there is no difficulty.

241. Sir *J. Graham.*] You are not prepared to say that the passage might not be made more quickly by keeping the vessel three or four points from the wind by traverses?—For a day or two during the prevalence of those spring tides.

242. That would be a question of time?—Entirely.

243. *Chairman.*] And wear and tear?—Yes; perhaps the wear and tear is more material than the other

244. Sir *I. Graham.*] It would make a great difference in the strain of the vessel, whether she were kept five points off the wind, or went direct?—No doubt by making traverses you might ease the vessel considerably.

245. Mr. *Mullins.*] Have you ever visited the Island of Socotra?—Never.

246. Have you been in the Red Sea?—Never.

247. Sir J. *Graham.*] As to steamers going round the Point de Galle, have you no fear of any particular danger in those seas, as affecting steam navigation?—There is a very strong current setting round there at times, which might make a difficulty in getting round; but they would go off to the southward, it might prolong them a day or two.

248. As to the gales in those seas which you traversed in steam-vessels, are they heavier than those in the Indian sea?—Not heavier.

249. Mr. *Mullins.*] Do you know anything of the passage between Ceylon and the main land?—No, I do not; but I should think there would be very little difficulty in a steamer going between the Bassas and the Island. I understand the question to be with reference to that; ships never go withinside of those reefs that run out from the island, and I understand the question to be with reference to her going within side. It is very possible for a steamer to go withinside of those.

250. It is your opinion that it would be perfectly safe for a steamer?—Yes.

251. Have you visited Trincomalee?—Never.

Sir *David Dunn* called in and examined.

252. *Chairman.*] How long have you been post-captain in His Majesty's navy?—Going on 24 years.

253. When, and how long were you upon the Indian station?—About three years.

254. At what period?—From April 1832 to April 1835; I speak of being also lately in India; at Trincomalee during the time I have mentioned.

255. You are, of course, acquainted with the Bay of Bengal and the shore?—I was voyaging there the whole of the time.

256. Would there be any difficulty in a steamer making the passage from the Hooghly to Madras and Point de Galle in the south-west monsoon?—I should say none, judging of the power of steam in Europe, not of Indian steamers.

257. How would you make that passage?—I should say from the light-vessel to Point Palmyras, and from thence along the shore on to Madras, as close to the shore as possible.

258. Is there no difficulty between the light-vessel and Point Palmyras during the south-west monsoon?—I should say that the tug of the vessel would rest in making that passage of 60 or 80 miles, but I should not fear any steam-boat such as is navigated in Europe in not making it particularly as she would not bow the sea; she would be on the larboard tack, perhaps fore and aft sails drawn.

259. Does the south monsoon blow home on the Coromandel coast?—Certainly not; across the the Candy heads it blows, because there is no high land there.

260. From the Point Palmyras to Madras the south-west monsoon does not blow home?—It does not; I have anchored in all parts of the coast in the height of the south-west monsoon.

261. From Madras to Point de Galle would be the same, would it?—Smoother, decidedly smoother, for the south-west wind would be blowing off Point de Galle and Ceylon.

262. Then the south-west monsoon in the Bay of Bengal opposes no obstacle whatever?—None to a steamer; I judge by the steamers in Europe, not by the steamers in India.

263. How many knots an hour do you suppose that a powerful steamer, take the Berenice, of 240 horse, and 700 tons, would be going this course in the south-west monsoon?—At starting from the light-vessel to Palmyras, I should say four or five knots an hour for that distance, whatever it is, 80 miles I believe; from Palmyras to Madras I should say 6; from Madras to Point de Galle seven or eight; under the lee of Ceylon smooth water.

264. Are there not occasionally gales of wind on that coast that do blow home?—The monsoon gales, that is, the periodical storms at the change of the monsoon, blow home most furiously, but they do not last more than 30 or 48 hours at the utmost.

265. Lord *Sandon.*] Are those so periodical that you can be aware of them beforehand, and avoid them?—Invariably, by the barometer.

266. So that no vessel need be exposed to them?—None;—you may know them three or four days before they come; the barometer does not act quickly there generally, but on those storms invariably.

267. Sir *J. Graham.*] Are there harbours into which the Berenice could put between Madras and Point De Galle, and between Madras and Palmyras?—Between Madras and Point de Galle, Trincomalee; between Madras and Palmyras, none.

268. If she were caught in one of those monsoons which do blow home, would her fate be inevitable?—By making an offing of 100 miles, as we do under canvas, we find the wind very much less than towards the shore, and I should apprehend no danger by her lying-to; she must not attempt to proceed.

269. If she were caught close in, what must she do?—By the previous warning the barometer would give, if she were on the coast she ought to make an offing.

270. Her safety would depend upon her offing being secured before it blew hard?—I should say so; but the barometer invariably acts; we leave the roads under canvas, and ride the gale out by lying-to a 100 or 120 miles out.

271. *Chairman.*] Is there any instance of a man-of-war having been lost in one of those gales?—I believe the Dover, commanded by Sir Edward Tucker, was stranded there in a monsoon gale at the period of the expedition to Java.

272. In the north-east monsoon, is there any difficulty whatever in the Bay of Bengal?—None whatever.

273. It is still monsoon in comparison with the south-west, is it?—The power of the wind is by no means so strong as the south-west.

274. How many knots could you go against the north-east monsoon?—I should say, averaging six or seven.

275. Are you acquainted with the harbour of Point de Galle?—No, I am not.

276. Do you know anything respecting it from report; you must have heard from the officers of the navy, whether steamers could make use of it as a port?—I have always understood that it was admirably adapted for steamers.

277. For the repair of steamers, would not Trincomalee afford every sort of convenience and advantage?—I should say, decidedly.

278. Is there a king's dock-yard there?—There are ample means if artificers are sent; the accommodation is ample.

279. Mr. *Crawford.*] Do you happen to know why artificers are not kept there?—Owing to the foreign dock-yards being reduced to certain establishments and that among the rest.

280. Have you ever heard it attributed to the unhealthiness of Trincomalee?—Never; and of late years, Trincomalee has decidedly improved in that respect.

281. From what cause?—They have opened a road from the Candian country to Trincomalee, and the jungle immediately adjoining Trincomalee has been cleared away very extensively, and has added much to the healthiness of the place.

282. Is there a rising and falling tide there?—About three feet, not more than three feet.

283. *Chairman.*] What is your opinion of the practicability of making the passage from Point de Galle to Socotra, in the south-west monsoon?—I should say in the strength of the south-west monsoon there might be a difficulty in rounding Point de Galle by keeping in the current, but perhaps, by going inside the Bassas, the passage might be made even in the teeth of the south-west monsoon; the Bassas, are the shoals that lie off, but the rush of current from the Malabar coast in coming into Bengal is to be avoided.

284. Sir *J. Graham.*] How many knots does that run?—I have experienced from two to three and a half; I have heard it stated more, but have myself experienced that.

285. Does it vary, or is it uniform?—In the height of the south-west monsoon it is steady for six weeks or two months of the fury of the monsoon, but it falls off rapidly and changes prior to the change of the north-east monsoon. In the event of not being able to force a passage close in by Point de Galle, the difficulty, in my mind, can be obviated by making an offing on the starboard tack of 100 or 150 miles, to a low northern latitude, and then going on the laboard tack with canvas set, I should conceive, steering for Socotra. Socotra I have never been at; I have no personal experience with Socotra.

286. Mr. *Crawford.*] Do I understand you as supposing such weather as would render the calling of the steamer at Point de Galle impracticable?—Not of calling, but of rounding Point de Galle. In the event of the current being too strong for that six weeks or two months (for I do not think that it is longer than that), in that case I recommend the going under canvas on the starboard tack, and making an offiing of 100 or 150 miles, and so keep out of the current with a regular sea, not a chopping sea, and you would fetch Socotra even if your machinery broke, I conceive.

287. Lord *Sandon.*] Should you go to the south of the Maldives?—Yes, perhaps south; as I drew off from Point de Galle, and the wind might drive to the southward, I would lie south-east or south south-east, and when I had made an offing and the wind had headed me, I conceive that I might weather the Maldives; I would set [illegible] for Socotra under canvas and steam. I have no personal experience of being at Socotra; my experience is entirely confined to the Malabar coast.

288 Sir *J. Graham.*] Have you much experience of the sea to the westward of Point de Galle?—I have crossed that about six times.

289. How far to the northward have you been towards the Persian Gulf?—In coming from Batavia to Bombay, through the Straits of Bancas, I rounded Point de Galle about 120 or perhaps 150 miles.

290. Do you think in Europe we have any experience of steam navigation of such length and such difficulty, considering the strength of the currents, as the passage between Socotra and Trincomalee, rounding Point de Galle?—Yes; I conceive the passage from Falmouth to Gibraltar, in the winter months, to be quite equal to that passage.

291. Bearing in your mind the currents of the monsoon and the sea, such as you have seen it?—The currents can be avoided, by making the offing that I speak of.

292. Do you think the whole passage across the bay from Falmouth to Gibraltar is formidable?—Quite; I have no personal experience of those long voyages, but, from what I have seen in winter passages, in steamers of 160 horse power, I should say quite.

293. The distance is greater, is it not, from Socotra to Trincomalee rounding the Maldives in the way you recommend, than from Falmouth to Gibraltar?—I should say greater, certainly.

294. With regard to the sea?—The sea is not equal, in my mind, to what is encountered in the winter in the Bay of Biscay, and off the coast of Portugal round Cape St. Vincent, and on to Gibraltar.

295. Did you encounter any bad weather in those six voyages that you made yourself in those seas?—It is squally and unsettled weather in the south-west monsoon always; but when the squalls blow over, a calm almost always intervenes for a short time.

296. But in those European seas you have many gales; in those six voyages in India, do you consider that you saw heavy weather or not?—I conceive that the passage from Falmouth to Gibraltar in the wintry weather is far more severe than any weather I ever experienced in India in the south-west monsoon.

297. Lord *Sandon.*] Were all those six voyages in the south-west monsoon?—No, two of them.

298. Sir *J. Graham.*] Was it ordinary weather in those cases?—Double-reefed top-sail weather.

299. You have seen something more formidable than that in the European seas?—A great deal.

300. Have you reason to believe that there is never anything more formidable than than you encountered in those six voyages?—I have heard of it being more severe, but I have rarely been in weather in India more than treble reefed topsails.

301. And the information which you have received from your brother officers leads you to believe that that is rarely experienced?—What I have experienced is double and treble reefed; I have heard of close reefed, but I have never experienced that excepting once.

302. Your information and experience would lead you to believe that the worst weather in the Indian seas is not so bad as the winter gales prevalent in the Bay of Biscay?—Certainly.

303. What is the result both of your experience and inquiry of your brother officers?—That is the conviction of my mind from what I have heard.

304. Sir. *J. Hobhouse.*] Nor the navigation in other respects of the Indian seas more difficult?—By no means so difficult.

305. *Chairman.*] In going to the southward, the distance where you would encounter bad weather, and a strong current, is confined to that of 100 or 150 miles, is it not?—I confine my observations as to the strength of the current and the power of the wind in the south-west monsoon to the distance of 100 or 150 miles from the Bassas.

306. How many knots an hour could you go those 150 miles with a powerful steamer such as the Berenice?—Going on the starboard tack under canvas and steam, I should say for the 100 or 150 miles, she would average five knots an hour.

307. Then, what course would you take when you had got 150 miles?— would then go on the larboard tack, under steam and canvas, as near as she would lie to the wind, taking it for granted the wind would be to the southward; south-west, perhaps south-south-west at that distance from the land.

308. How many knots an hour should you make then?—I should say, averaging six or seven.

309. If your machinery broke could you make a sailing passage of it?—I should think the passage might be effected under canvas in the event of the machinery breaking.

310. Sir. *T. Troubridge.*] Always speaking of Socotra?—I have no personal knowledge of Socotra.

311. Mr. *Crawford.*] Do you still consider that you should not have occasion to go to the south of the Line; you said that you would have a low northern latitude?—I conceive that I should have no occasion to go to the southward of the Line to effect my passage; I might pass to the southward. but if not, the passage is free between the islands, and smooth water the whole of the way; in the event of not passing to the southward of the Maldives, I should say the eight degree channel.

312. Lord *Sandon.*] The Maldives giving you a shelter from the violence of the monsoon?—Yes.

313. *Chairman.*] How many knots an hour could you go making a direct passage?—Going in the teeth of the south-west monsoon, I should shape my course for the eight degree channel, Maldives and Laccadives, and I think under steam I could make three or four miles an hour against wind and current.

314. Sir *J. Graham.*] What European experience leads you to think that any steamer you have seen could make three knots an hour against the wind you have seen, and the current you have described?—I judge from a steamer from Londonderry to Liverpool of 160 horse power; from what I have seen, I judge that a vessel of 200 or 250 horse power would do that.

315. The experience here is only against wind; have you any experience of a steamer against current combined with wind still making head at the rate of three knots an hour?—By passing close to the land at Point de Galle, I conceive that the power of the current would be neutralized, and consequently, that there would be merely the wind to encounter.

316. When you describe the current as running two or three miles an hour, that is outside the Bassas, and not inside?—Outside the Bassas.

317. Is there a current in the inside channel?—I should say much less than outside the Bassas.

318. What would you put that current at inside at the height of the monsoon?—Perhaps two miles an hour.

319. Have we European experience of such a current with such a wind as the monsoon, and any steamer making head at the rate of three or four knots an hour against it?—The power of the monsoon, such as I have experienced, being from double-reefed topsails to treble reefed topsails, and the current reduced to two knots an hour, I conceive that the steamer that I have had experience in would make a successful passage.

320. *Chairman.*] How many knots an hour, did you say?—Three knots.

321. How far would that three knots an hour be?—I should confine that current to the distance of 60 or 80 miles from Point de Galle.

322. You are going through the eight-degree channel, are you not?—Yes; no sailing ship ever passes withinside of the Bassas that I know of.

323. If the point of destination were Point de Galle?—In that case the Bassas would be out of the question.

324. Sir. *J. Hobhouse.*] Have you had much experience in steam navigation; have you been very often on board steam vessels?—Twelve or fourteen voyages.

325. Sir *J. Graham.*] in what seas?—From Liverpool to Dublin; from Liverpool to Belfast; from Liverpool to Londonderry; at all seasons.

326. You have no experience except in the narrow seas round England?—None.

327. Sir *T. Troubridge.*] Have you made the passage of the eight or nine-degree channel from Point de Galle?—No.

328. Sir J. *Graham.*] Have you experience to the westward of the Maldives and the Laccadives?—No.

329. Mr. *Mullins.*] Have you sufficient experience of the effects of the southwest monsoon to enable you to judge of its effects in the passage between Socotra and Point de Galle?—I confine my experience to 100 miles from Point de Galle, in the south-west monsoon.

330. Sir *J. Graham.*] Then as to the monsoon between Socotra and the Maldives, you have no personal experience whatever?—None whatever of my own knowledge.

331. *Chairman.*] In what direction, by compass, is that 100 miles, that you would go in rounding Point de Galle?—I should say, from south-west to west-south-west.

332. Was that in the south-west monsoon?—Yes.

333. Mr. *Mullins.*] Did you ever understand whether the south-west monsoon blows with greater force, within 100 or 150 miles of the Malabar coast than at a greater distance from it?—I have never considered the strength of the south-west monsoon to be so great from 150 to 100 miles off the Malabar coast.

334. Mr. *Bagshaw.*] So that the same rule would govern a vessel going to Socotra as to Bombay, with regard to the monsoon; the monsoon blows steadily from the south-west?—Always.

335. Therefore you would have no objection to navigate a vessel with the experience you possess, from Point de Galle to Socotra?—None whatever.

336. Sir *J. Graham.*] A sailing-vessel, none?—I confine my observations to a sailing-vessel: I have no experience of steam, except as a passenger.

337. Mr. *Mullins.*] In fact, you have been in that part of the sea where the south-west monsoon blows with the strongest force, or is generally supposed to blow with the strongest force?—Yes.

338. *Chairman.*] Going direct from the south-west channel to Socotra, could you carry sail?—I should say not.

339. Is the wind as unfavourable that way as it is from Socotra to Bombay?—No; from Bombay to Socotra, I should say the wind was immediately in our face; and from Galle to Socotra, I should think the wind would be three or four points on the larboard bow, merely judging from the south-west monsoon blowing, and the number of hundred miles between Bombay and Point de Galle.

340. What difference do you think those three or four points of the compass would give over the vessel that had the wind dead on end?—I should say two miles an hour at least.

341. Do you think the passage could be made from Bombay to Socotra with the wind dead on end, in the south-west monsoon, in a steamer like the *Berenice*?—I should think the distance too great for a steamer to make that voyage in the face of the south-west monsoon, but the impression on my mind is, that a steamer can always make an offing from Bombay harbour at any time of the monsoon.

342. Sir *J. Graham.*] By bearing to the southward?—I mean, making the distance of 60 or 80 miles, by shaping her course along the Malabar coast.

343. To the southward?—To the southward.

344. *Chairman.*] Why do you say the distance would be too great?—I think the distance is 1,200 miles, or about that; the quantity of coal required for that voyage, I should imagine, would be too much for any steamer that I have any knowledge of.

345. How many knots an hour do you suppose that she would be able to go with the wind dead on end?—My knowledge of the southwest monsoon is confined to within 100 miles of the Malabar coast: I should say that she would make that distance two and a half and three miles an hour, perhaps more.

346. Would the force of the monsoon increase or decrease as you go to the westward?—Decrease; I confine my observation to the fury of the south-west gale: in getting out of Bombay harbour we invariably find the force of the wind lessen as we get out, and to pass down the Malabar coast we have the wind abeam rarely before.

347. If an accident happened to her machinery she would, of course, be obliged to go back to Bombay?—As a matter of course; there is no alternative.

348 Supposing the fury of the south-west monsoon to prevent her from making the direct passage, even in case she was obliged to make an offing to the southward. when she took her course again for Socotra, would she be in as favourable a position as a steamer going through the eight degree channel; would she have as many points of the wind in her favour?—I conceive that a steamer making a voyage from Bombay to the southward of the Malabar coast, would fetch to the westward of the Maldives and Laccadives, and consequently, would be on a par with the Point de Galle steamer passing through that passage.

349. You mean that she would fall into the same track?—Yes, meet to the westward of the Maldives and the Laccadives.

350. Then the distance that each would have to run would be about the same, would it?—I conceive that the distance from Bombay to the westward of the Maldives and Laccadives would be greater than the distance that the steamer going through the eight degree channel meeting there at that point would have to run.

351. Has not the moon an effect on the wind under the Line?—In the full and change of the moon we find that the south-west monsoon is very squally, even in the quartering of the moon we find it always unsettled.

352. Sir *J. Troubridge.*] What notice does the barometer give you on the east coast of Ceylon of an approaching gale?—I have known three or four days notice but generally two.

353. That is to say, by a continual falling?—Yes; Sir John Gore ordered me to proceed on board and take command of the squadron, in the event of the barometer falling there, and that was two or three days prior to the blowing

354. Mr. *Bagshaw*] In this long distance between Point de Galle and Galle and Scotra, going the course that you recommend, would you steam the whole of that long distance?—I take it for granted that the fore and aft sails would draw, perhaps during the whole passage; but my experience is confined to 100 miles of Point de Galle.

355. Mr. *Mullins.*] Should you think that it would be advisable to employ steamers between Calcutta and Suez of a less tonnage than 1,000 tons, or of less horse power than 250 horse power?—I should say the larger the steamer the better, judging from the first class steamers of this country.

356. You think that they could make better head-way in the case of the south-west monsoon blowing its greatest force, than smaller steam vessels?—Certainly.

357. *Mr. Crawford.*] In consequence of the greater power?—They are more steady in consequence of the wind a head.

358. Sir *J. Hobhouse.*] Then it is your decided opinion that a steamer would not be able to carry coals to enable her to go direct from Bombay to Socotra, from what you have seen of steamers?—From what I have seen, I should fear that she could not go that distance.

LIEUT. WELLSTEAD, CALLED IN AND EXAMINED.

359. *Chairman.*] Are you a lieutenant in the Bombay navy?—I am.

360. Were you employed by the government of Bombay to survey the Island of Socotra?—I was.

361. How long were you there?—On the first occasion two months, on the subsequent occasion six months.

362. Were you employed in conjunction with Lieutenant Haynes of the Bombay marines?—I was.

363 In what year?—In 1834.

364. Are there any harbours or anchoring grounds in Socotra, where a vessel may lie in safety the two monsoons?—There are two harbours in Socotra, one of which is available in the north-east monsoon, and one of which is available in the south-west monsoon, but there is no single harbour which is sheltered at all seasons.

365. What are they called?—The two harbours are Bunder Delechee, which is available in the south-west monsoon, and which is on the north-eastern side of the Island: and the other, Goobet Gollonsier on the north-west.

366. Is there a complete shelter for steamers in those bays?—There is.

367. Is there any swell that would make it difficult to take off coals from shore?—Not the least, it is perfectly smooth water.

368 How near could a vessel lie to the shore?—In either case, about a quarter of a mile from the shore

369. Sir *T. Troubridge.*] An open roadstead, or a harbour?—A harbour.

370. Easy of access for any sized vessel?—Yes.

371. *Chairman.*] Is there any water near there?—Fresh water can be obtained from both of them within a short distance.

372. Good water?—Good water.

373. Then, as a depot for coals, these harbours are complete?—They are, with this exception, that it would be necessary to shift the hulks from the one to the other at a change of season, provided hulk were used.

374. Sir *T. Troubridge.*] Are there any dangers at all in the environs of Socotra, rocks and shoals?—None.

375. *Chairman.*] Were you there at the time the detachment was there? I was.

376. Do you know the reason why the detachment left the island?—The detachment left the island in consequence of the insalubrity of the station which they occupied.

377. Sir J. *Hobhouse.*] Do you think that that, insalubrity applies to that station only, or to other parts of the island?—It does not apply to the mountains, which are over the station.

378. Sir T. *Troubridge.*] But the establishment for supply of those vessels must be upon the coast?—If you have a hulk, there is no occasion for any establishment.

479. If there is to be a depot there, the arrangements must be on the beach? Yes, but the natives can always shift and unshift the coals; I do not consider that it is necessary to have the troops near the shore, the troops might be kept on the higher ground. Of the first detachment that was sent there nearly the whole of the Europeans died; they were encamped in a plain at the base of those mountains, and there was a considerable quantity of water; it was a marshy kind of ground; there is good deal of vegetation there, and the face of the country is the same as that of Africa. When the second detachment came to the island, the officers marched them from the sea-beach directly to the mountains, and they did not halt at the beach, and they found it as healthy as in England.

380. Lord *Sandon.*] About what distance are the mountains from the beach?—About seven miles.

381. Sir J. *Hobhouse.*] How long did they remain in the island?—About six months.

382. During that time were they not affected by the climate?—No.

383. Lord *Sandon.*] Were they there at the same period of the year as the former detachment?—No, but it was equally unhealthy.

384. Sir J. *Hobhouse.*] Did you ever make the passage from Socotra to Bombay?—I have been from Bombay to Socotra.

385. Have you been often?—Three times.

386. Did you ever go during the south-west monsoon?—Yes; not landing at Socotra, but touching Socotra.

387. By steam?—No, in a sailing vessel; never in a steamer.

388. Was each of those times, or one of those times during the south-west monsoon?—One of those times, the last.

389. How long were you going? Thirty-seven days to Mocha, which is the lower part, just within the entrance of the Red Sea.

390. *Chairman.*] How long were you going to the longitude of Socotra? We pursue a very peculiar route, which can be scarcely conveyed in words. The sailing vessels never attempt to go direct across, but in place of that, they run down to the southward of the Line about nine degrees south; then we get the south-east trade, and shape our course to the westward by the Sechells, run into about the longitude of Socotra, and then go due north for Cape Guardafin.

391. Sir *T. Troubridge.*] You go to the westward of the Maldives?—Yes,

392. What time does it occupy?—The average voyage would be about 50 days in a good sailing vessel.

393. To Mocha?—Yes.

394. To Cape Guardafin?—I cannot tell.

395. How long does it take from Mocha to Cape Guardafin?—About 10 days.

396. Sir J. *Hobhouse.*] You never made that passage in a steamer ?—No ; in one of the Company's vessels of war, a 10-gun frigate.

397. Sir *T. Troubridge.*] What weather did you experience ?—We took in a reef leaving Bombay but shook it out soon after.

398. On the whole, had you fine weather or bad ?—That is indicative of the finest weather you can have ; that sort of weather in which a boat could have made the passage.

399. Speaking generally, you had fine weather the whole of the way ?—Yes.

400. *Chairman.*] But in the south-west monsoon ?—Yes ; I will mention one fact which is the strongest that can be given, I think, in proof of what steamers might be supposed to do. If a question is put to any seaman, can a steamer proceed in that direction where a sailing vessel would require to beat to windward ? they would answer, it can. Our vessels have gone across the Arabian Sea, from Bombay to Muscat, at all seasons of the year, and the average passage is 21 days.

401. Sir *J. Hobhouse.*] Even during the south-west monsoon ?—Yes ; that is, directly against the south-west monsoon.

402. Sir *T. Troubridge.*] What are the difficulties from Muscat to Socotra ?—You have the same monsoon against you the whole way.

403. Have you any experience on that coast ?—No ; no vessel goes along that coast, it is a dead lee shore ; we find the wind directly against us going from Bombay to Muscat ; I adduce that to prove that there is more importance attached to the south-west monsoon than it deserves ; if our sailing vessels can beat against that, what is to prevent steamers going ?

404. Do you believe the south-west monsoon to be strong in the northern parts of the Arabian Gulf than it is in the parallel of the eight degree channel ; as you approach the Line its force weakens.

405. Sir *J. Hobhouse*] Do you think that there would be any difficulty in a steamer of the size of the steamer that the Eest India Company have lately built, passing during the south-west monsoon from Bombay to Socotra ?—I conceive that there would no difficulty

406. Lord *Sandon.*] Pursuing what course ?—Quitting Bombay, I should put her upon the starboard tack, set the sails, and run down to eight or nine degrees north of the Line, where the force of the monsoon is considerably lessened ; thence I would proceed direct to the westward by steam into about 52 longitude, and then shape the course for Cape Guardafin.

407. Sir *J. Hobhouse.*] How long would a steamboat so going occupy ?—That requires calculation, which I will go into and give in another day.

408. *Chairman.*] At some period of the monsoon would it be practicable to go direct from Bombay to Socotra ?—Yes, at some periods ; I would not attempt it at the height of the monsoon.

409. For six weeks ?—Longer, two months ; but it is found in the Mediterranean that they never put their heads directly against it when they can help it ; they encounter it three points from the wind, and they find they make better way by it.

410. Sir *J. Hobhouse.*] Have you had much experience of steam-vessels ?—Not much ; I never belonged to one. I came overland from India, and in one by the Mediterranean.

411. *Chairman.*] The opinion of the persons in India is very much altered as to the possibility of making this passage, is it not ?—Very much, indeed.

412. Mr. *Bagshaw.*] Have you had any experience in the Bay of Bengal ?—Not so much as in the Red Sea.

413. Have you been up to Calcutta ?—Yes.

414. Along the coast of Coromandel —Yes.

415. Lord *Sandon.* Did you ever face the south-west Monsoon ? —I once came round.

416. Sir *T. Troubridge.*] Have you any experience of making the passage by the coast ?—No.

417. Are you acquainted with the passage from Point de Galle to the Red Sea ?—No ; except being acquainted with the state of the weather off the Maldives.

418. Lord *Sandon.*] should you conceive that there was any difficulty in going from Point de Galle in the south-west monsoon towards Socotra ? Not if they adopt the course which I propose, to get more to the westward before they go to the north.

419. Would you take them through the eight degree channel ?—I conceive so, that would be the best.

420. Sir *T. Troubridge*] Have you ever been through yourself ?—Yes.

421 *Chairman.*] Are you acquainted with the island of Abdalkoory ? It has not been surveyed when I quitted the coast but a survey has since been made of it ; the report has not arrived.

422. Do you know whether it is favourable as a depot or not ?—That I cannot answer.

423. Macullah, are you acquainted with ?—Very well, indeed.

424. Is it fit for a depot ?—In the north-east monsoon it is the most admirable that can be selected ; but in the south-west it cannot be approached.

425. What is your opinion of Aden ?—Aden also would answer very well for a depot in both monsoons.

426. How does it happen to serve for both monsoons ?—It has two harbours.

427. Sir *T. Troubridge*] How far to the westward of Socotra does the south-west monsoon extend ?—As far on the Arabian coast as the port of Aden.

428. How far from the Arabian coast within the Gulf of Aden ?—Nearly mid-channel ; but by keeping on the African coast the monsoon is avoided, and smooth water is obtained.

429. Lord *Sandon.*] Then, from Cape Guardafin to the Straits of as Babelmandel, you might sail in perfectly smooth water by keeping along the African shore ?—Perfectly.

430. Then there would be a reason for not looking to the Arabian shore at all for a depot for coals.

431. *Chairman.*] If you have a depot at Socotra, you will stand in need of no depot whatever on the Arabian coast outside of the Straits of Coromandel ?—That is my opinion.

432. Have you any doubt of Socotra ?—I have mentained the doubt whether the seas were not too heavy for steamers, but that opinion gives way to the opinion of others, that the sea is not two heavy for steamers.

433. Sir *T. Troubridge*] It is a short chopping sea ?—It is a meeting of seas.

434. Lord *Sandon.*] Are the principal dangers of the sea to the east and west of Socotra?—We generally pass to northward of it, where we experience the swell.

435. *Chairman.*] What are the objections to Tamarinda Bay?—In the north-east monsoon the heaviness of the swell producing a dangerous surf from the sea beach, and rendering landing at most seasons almost impracticable.—In the south-west monsoon it is equally bad anchorage, in consequence of the holding ground being very indifferent, and the violence of the gusts that sweep from the mountains.

436. Why is the other bay free from the same objection, both being under the lee of the island?—Bunder Delechee is sheltered from the violence of the south-westerly winds by the mountains that rise up close by the shore; calms and light breezes prevailing there when violent gusts are experienced in Tamarinda Bay Goobet Gollonsier is sheltered from the north-east monsoon and swell by the projecting point affording every necessary degree of sof shelter to vessels lying there at that period.

437. Were you, for any length of time, employed in the Red Sea under the orders of the Bombay Government?—I was employed for three years in the survey of the Red Sea, under the orders of the Bombay Government.

438. When was that?—In 1830, 1831, and 1832.

439. Are you acquainted with the whole of it?—I am.

440 Is there any difficulty in a steamer of power like the Berenice, going through the Straits of Babelmandel?—Not the least.

441. Is there any difficulty from thence to Suez?—None.

442. At no season of the year?—No.

443. Are the winds in the Red Sea less strong than the south-west monsoon in the Arabian?—About the same strength.

444. With respect to steamers, you think that steamers in the Red Sea should be of the same power as those without?—I do.

445. What is your opinion of Mocha as a station?—That it cannot be made available as a station; I speak most decidedly; for during nine months of the year the southerly winds blow with such violence that you can only communicate with the shore at intervals, and it is an open roadstead.

446. Which do you think the best station between Socotra and Suez?—The island of Camaran which is a good harbour, is partially susceptible of cultivation; has great advantage in its insular position, which should not be forgotten where you have anything to do with the Arabs; you will find it much better to be upon an island, than to be upon the main land, and five fathoms of water between the island and the main.

447. Sir *T. Troubridge,*] Is there any difficulty in the navigation into this harbour?—Not any.

448.—Is there any lighthouse?—No.

449. Is it necessary to have one?—Should it be made a permanent station, it might be considered advisable to have a lighthouse.

450 Lord *Sandon.*] Is the weather very hazy?—Sometimes.

451. Is the climate healthy?—I do not consider any part of the southern part of the Red Sea is healthy; people there are subject to a kind of dropsy, which affects all the extremities.

452. Sir *T. Troubridge.*] Is the anchorage safe after you have got through the channel?—It is sheltered from all winds.

453. Lord *Sandon.*] Is there any difficulty in approaching it at all winds?—No.

454. Sir *T. Troubridge*]. What is the width of the channel?—As far as I recollect, about a mile a half broad.

455. Lord *Sandon.*] What is the formation of the island?—Like all those islands, principally of shelly limestone.

456. Is there water upon the island?—Very good water; that island has been always considered as a point of great importance; when the Portuguese first went to the Red Sea it attracted their attention, and during the time that the French were in Egypt a mission was also sent to examine it.

457. Is it peopled at all?—It has a few inhabitants.

458. Is its soil capable of cultivation, and of containing a large population, in case a depot were fixed there?—Yes.

459. *Chairman.*] Is it high ground?—No, rather flat and low.

460. Lord *Sandon.*] Is it based upon coral?—Coral enters very largely into the formation of all those islands.

461. Mr. *Mullins.*] Is it equidistant from Suez and Socotra?—I do not know that, but I should imagine it is not very far from being so.

462. Sir *T. Troubridge.*] You spoke of five fathoms, is it five fathoms low water?—There is very little rise and fall of the tide.

463. Lord *Sandon.*] Two feet?—Rather more; the difference between high and low water is between three and four feet.

464 Sir *T. Troubridge*] What are the prevailing winds in the Red Sea?—The north-westerly winds prevail throughout the year in the northern portion; but, in the months of July, August, and September, they are at their height, and frequently then blow the whole distance of the sea to Mocha. Southerly winds prevail in the southern portion for nine months in the year, blowing near the entrance of the Straits of Babelmandel with equal violence with the north-westerly breezes in the upper portion of the sea. The space equidistant from either extremity of the sea is left subject to calms and variable winds, excepting when the southerly winds blow strongly in September, October, and November, when they not unfrequently blow home to Suez.

465. Are there any currents?—The currents in the Red Sea are not of sufficient importance to attract much attention as regards steam navigation.

466. The information which you have given the Committee is entirely from experience?—It is.

467. Both as to Camaran and the winds?—Yes.

468. *Chairman.*]—How far are the following places on the coast eligible as depots: Hodeida? Open roadstead; very indifferent.

469. Soheia?—Objectionable, in consequence of the shallowness of the water.

470. Camfida?—Also indifferent anchorage.

471. Judda?—Judda has been hitherto used as a coal depot; and I see no other objection to it than that which occurs to any other port in the Red Sea, that it is a port fronted by almost innumerable coral rocks, so that you cannot get in at night time.

472. Yambo?—Yambo would make a good depot.

473. Mr. *Mullins.*] Is it your opinion that Camaran is the best depot of all those that have been named in the Red Sea?—Decidedly; a glance at the chart will show that there are no reefs fronting this part of the coast, and having a depot there, we should not be subjected to any annoyances from the Arabs, which I look upon as unavoidable in every station on the shore; and also, it is a central position between Suez and Socotra.

474. *Chairman.*] On the western coast of the Red Sea are there any ports?—There are several ports on the western shore, but I would avoid that shore.

475. Why?—Because the navigation is more intricate and more dangerous.

476. Lord *Sandon.*] As regards the winds, are the two shores equally advantageous?—The winds, blow up and down the sea, so that it makes very little difference.

477. *Chairman.*] In case the plague, or war, should at any time interrupt the passage through Egypt, is there any other course by which the communication could be kept up by the Red Sea with which you are acquainted, or about which you made enquiries?—I would beg to draw the attention of the Committee to the old and now almost-forgotten route by way of the Gulf of Akkaba to Garsa; a Roman road formerly extended between those two points, and a communication by this route might be obtained when it might be found impracticable through Egypt. There is an anchorage near the northern extremity of this sea, under a small island.

478. Lord *Sandon.*] Is there any difficulty in navigating that part of the Red Sea?—It cannot be navigated but by steam, that gulf.

479. What width?—Ten to 12 miles, but has no good anchorages.

480. Mr. *Mullins.*] Have you any knowledge as to whether there are wells across the desert from that point to the coast?—To my knowledge that route has not been traversed by any European.

481. *Chairman.*] During the three years when you were in the Red Sea, was there any occasion when the plague would have interrupted the intercourse by the Red Sea?—Not once.

482. Mr. *Mullins.*] From the result of your examination, which of the two points should you prefer, Suez or Cosier, for the convenience of passengers, and also for celerity?—Suez.

483. Lord *Sandon.*] You say that no interruption to the communication during those three years took place on account of the plague, was that on account of any extra cessation of the plague during those three years?—It might have been owing to that, but the caravan travels at all periods with pilgrims, whether the plague prevails in Egypt or not, between Cairo and Mecca; and yet, as far as my enquiries have gone, I never could find that it had more than once visited the Hedjehz.

484. What are the Hedjehz?—Places in which the holy cities of Mecca and Medina are situated.

485. Travellers would be exposed, however small you may estimate the risk, to the plague at certain seasons of the year, in passing from Alexandria to Suez? Whenever it exists of course there will be a risk.

486. Is there a probability that, if the current of communication through Egypt by the Red Sea were to become more frequent, the plague would be transmitted beyond its present limits?—I do not think there is; the previous question would show that it seldom leaves the immediate vicinity of Cairo and other cities in Egypt; it does not extend to the desert; it never accompanies the pilgrims; the previous question and answer will be received as a strong corroboration of this.

487. Mr. *Mullins.*] Have you ever been between between Suez and Cairo?—Yes, several times.

488. Is there any facility for obtaining water?—No; there is some water about 12 miles from Suez, but very bad.

489. You do not look upon it that that would present an obstacle to the conveyance of passengers?—the least.

490. *Chairman.*] If the steamers were regular, and of sufficient capacity to take that cargo, do you think that there would be any freight for them to India?—It would take some time to divert it from its present channel; but eventually I have no doubt that they would receive a large amount.

491. What is its present channel?—It is in the hands of natives, who would view our interference with great jealousy.

492. You mean that there is a traffic, but that the article would still go in the native vessels, instead of in the steamer?—Exactly.

493. Lord *Sandon.*] Do you suppose that the pilgrims would make use of the steamers?—The rich pilgrims would, I have no doubt, in a short time.

Lunæ, 26th die Junii, 1837.

MEMBERS PRESENT.

Mr. Bagshaw.
Lord William Bentinck.
Mr. Crawford.
Mr. Robert Gordon.
Sir J. C. Hobhouse.
Mr. Mullins.
Lord Viscount Sandon.
Mr. William Wynn.
Mr. G. F. Young.

LORD WILLIAM BENTINCK, in the Chair.

Thomas Love Peacock, Esq. called in; and Examined.

494. *Chairman.*] WHAT are you?—I am examiner of India correspondence.

495. You are particularly conversant with the subject of steam navigation to India?—I have paid a good deal of attention to it.

496. You were examined in 1834?—Yes, and in 1832.

497. You then gave it as your opinion, that for carrying into effect the communication with the Red Sea by steam, four vessels of 200 horse power, with a proportionate tonnage of three to one, would be required?—The proportion of power to tonnage.

498. That is, with Bombay?—With Bombay, I think that is rather too few than too many.

499. You gave that as your opinion then?—Yes.

500. Do you think any additional number will be necessary, or does your opinion remain the same upon that point?—I think it would be better to have five, and for this reason, I find that the Mediterranean packets at the time I looked at the establishment last, which is some time ago, however, but I believe it is the same now, required four to carry on the communication with Corfu. The vessel that left Falmouth on the 1st of January, left it again on the 1st of May, and, in the same order on the 1st of February, and the 1st of June. That is about 16,000 nautic miles; three voyages in the year to Malta, Corfu, and back. Of course those four vessels amongst them, performed in the year 64,000 miles. Now, the 12 voyages from Bombay to Suez and back are 72,000 nautic miles, and considering the great superiority of the means of repair which the Mediterranean packets have to those which the Indian steam vessels can possibly have, I should think that 16,000 miles a year would be the maximum of the possibility of their performance, one year with another, for any length of time each. Therefore, less than five steamers would scarcely perform the work. I find also that the great Scotch steam packets, which are vessels of great power, which run about two days of every week, and rest five, coming at each end of their voyage into a port of repair after every run of between 400 and 500 miles, perform only one run each way in the week, which is somewhat more; it is between 20,000 and 25,000 miles in the year, that is the maximum of their performance; but I think it cannot be taken as the basis of calculation for a long sea voyage; the Mediterranean packets are the only guides that we have as yet to go by. Besides, Captain Wilson has given it as his opinion to the Bombay government, that the Hugh Lindsay packet is only equal to two Red Sea voyages in the year, that is, 12,000 miles. It will, therefore, require six Hugh Lindsay's to carry on the voyage between Bombay and Suez.

501. Lord *Sandon.*] The Hugh Lindsay is not the standard to go by?—That is the only vessel the Indian government have, to which they can say, You go to a certain point and come back that is the only vessel that has been able to do that. She is a very strong vessel, well built, and has very great power, which is the only great advantage she has; she was only built to carry five days' coal, and she has carried 10 or 12.

502. *Chairman.*] Would you propose that each of these vessels should make the voyage out and home, or be relieved in the Red Sea?—There is an advantage in changing the vessel, provided it can be done in a port of repair, but not otherwise; but if it were relieved in the Red Sea, I should think it should be relieved by a vessel of precisely the same tonnage and power.

503. I suppose you would be of opinion that all the vessels should be of exactly the same tonnage and power, exact copies of each other?—Yes, exact copies of each other.

504. That all the machinery should be the same?—Yes.

505. And suit each other?—Yes; there would be a great advantage in having the vessel quite cool and clean, and ready loaded with coal, to start immediately on the other's arrival.

506. Lord *Sandon.*] Supposing no goods were carried?—Yes; and the passengers' luggage would be very small, and they would go into precisely the same cabins, they being precisely the same vessels; but if they go out of such a vessel as the Berenice into such a vessel as the Hugh Lindsay, they will not find the same accommodation, nor any accommodation for the same number of persons.

507. I think, in making the inquiry, we must assume that all the vessels are of the same power, and equal to the best of the two vessels that were first sent out?—Yes; the best of the two vessels that were sent out was not too good for any part of that voyage.

508. *Chairman.*] You had better now explain what the powers of the best of the two vessels are?—I will state both of them. The contracts were made for vessels of not less than 600 tons measurement, and not less than 200 horse power; that is to say, having cylinders of not less than 54 inches diameter. The Atalanta was built by Wigram and Green, in the river Thames, exactly, I may say according to the contract, which was made for 616 tons measurement; the old measurement. And the engines, which were made by Maudesley, had cylinders of exactly 54 inches diameter, with five feet stroke. The Berenice has about 50 or 60 tons measurement more than the contract, and two inches diameter of cylinder more than the contract; therefore, speaking in round numbers, the Atalanta may be said to be a

vessel of 620 tons, and 210 horse power; and the Berenice, of 660 tons, and 230 horse power. These vessels were to have been ready for sailing in July, 1836; by which it was expected they would have the advantage of the south-west monsoon, on the other side of the Cape. They were, however, not ready till six months later, but as soon as they were respectively ready they were despatched. *The computation* which was made of their voyages was, that they would reach Bombay in 59 days' steaming; the total distance was taken in round numbers at 1,200 nautic miles, the actual distance of their run being 11,500. The Consumption of coal was calculated at 20 tons a day, and the daily run was taken at 200 miles.

509. Lord *Sandon.*] In 24 hours?—In 24 hours.

510. *Chairman.*] Do you mean the average daily run?—Yes; it was taken at that; 12,000 miles would be the run in 60 days, and being 11,500, we allowed 59 days. The coal sent direct was Llangerrick coal, selected in very large pieces, the dust of Welch coal being good for nothing. The stations chosen were Teneriffe, Mayo, in the Cape du Verde Islands, Fernando Po, the Cape of Good Hope, the Mauritius and Cochin. Mayo was chosen after a good deal of inquiry respecting the best station in the Cape du Verde Islands, and there seemed to have been no very good one; that appeared to be the best, but after the arrangement had been made, we found reason to believe that the Isle of St. Vincent would be the best station in all that part of the world for a steam-vessel.

511. Lord *Sandon.*] Is that one of the Cape du Verde Islands?—It is the only island that has anything that may be called a harbour; all the rest are roadsteads. The time of detention could not be well estimated. the coal being sent to places almost entirely new to us. We set it down, however, at 16 days and a half. which turned out to be much too little, the detention being much greater. The average run which I mentioned calculated to the Cape was 34 days. The actual run of the Atalanta the steaming moving along was 35, and, therefore, we were only out one day in our reckoning.

512. Did she steam all the way?—She steamed all the way; she made about 210 or 220 miles on an average to Fernando Po, and from Fernando Po to the Cape she averaged 160; she steamed the whole of that long run against a south-east trade-wind, which we had expected to avoid by sending round to the coast of Africa. We sent her to Fernando Po out of the way, in order that she might avoid the south-east trade wind, but as she did not succeed in doing that, I should certainly recommend any other experiment that might be made by the Cape route to be made by St. Helena direct.

513. That is a shorter course?—A much shorter course, and I should have no doubt of the capacity of either of these vessels to have run against a south-east trade-wind the whole of that line.

514. *Chairman.*] Then she went seven knots an hour against a south-east wind?—Yes.

515. Was it blowing hard; does it appear by the log that it was blowing hard?—Sometimes there were strong fresh breezes; a strong head-wind.

516. Is there anything said about the swell?—No; he speaks of the current; he says he met with a very strong adverse current. The run from Fernando Po to the Cape is in round numbers 2,400 nautical miles, and is the greatest run that has ever yet been made by a steam-vessel at sea.

517. How many days was she doing that?—Fourteen. The Berenice we have only heard of from Mayo, one of the Cape du Verde Islands; it is just beyond St. Jago, between St. Jago and the main line.

518. How far is that?—These are the distances; Falmouth to Teneriffe, 1400 miles; Teneriffe to Mayo, 860; Mayo to Fernando Po, 2,009; Fernando Po to the Cape 2355; the Cape, to the Mauritius, 2271; the Mauritius to Cochin, 2,125; Cochin to Bombay, 575; total, 11,581.

519. Her first stage was 1,400 miles?—Yes.

520. How long was she doing that?—Seven days.

521. Did she take in coals then?—She took in coals at Teneriffe, and met with a storm in the Bay of Biscay which damaged her upper works, and she staid there for repair; she was there about a week.

522. What was her consumption of coals for each day, do you know; or how many days' coals did she take?—She took 250 tons.

523. Lord *Sandon.*] That would be 20 tons a day?—Yes, but she did not consume so much we allowed that to allow for wasteage and for accidents; her consumption of coal was less than that of any steam-vessel of which we have any knowledge; it was less than seven pounds per horse power per hour; eight is considered very little; ten or twelve is very common.

524. *Chairman.*] Can you account for that?—I can account for it from two causes; first, from what I believe to be the superiority of the boilers made by Maudesley to any other boilers whatever. They have some art of economising fuel; they make boilers smaller than others, but more effective; and secondly, to the great pains that were taken in the selection of the Llangerrick coal. The Atalanta had 20 tons of coal left when she arrived at the Cape, so that her power was more than 2,400 miles against the wind.

525. Lord *Sandon.*] Had she this wind pretty nearly the whole way?—South pretty nearly the whole way, as I see by the log, south and south east.

526. *Chairman.*] You did not expect that?—No; The captain himself was very doubtful about it; for he says in a sort of private diary, of which he sent me a copy, "I am exceedingly doubtful about my coals for this run;" at the end of every day he records his feelings and expectations, and the chance and expectation of his coal lasting to the Cape.

527. These two vessels were built originally as war-steamers, were they not; not as packets?—There was some misunderstanding on that subject; the vessels were built originally as the result of an arrangement between the President of the Board, which was Lord Ellenborough, and the Chairman of the Court of Directors; there was at that time, and there has been, as is well known, a negotiation pending between the court and the King's Government respecting the division of the expense. It was always the basis the court took, that they would act on the recommendation of the Parliamentary Committee. These vessels were to be built in anticipation of that arrangement, or in case of that arrangement coming to nothing, that they should be serviceable as war steamers in the Persian Gulf.

528. Lord *Sandon.*] To be convertible?—To be convertible, but it appeared so exceedingly probable that they would be employed as packets, that they were constructed very much with a view to being serviceable as packets, and, at the same time, to render them as efficient as possible as vessels of war. If they had been built exclusively as vessels of war, they would certainly not have been built with racing decks; but being built with a view to the ultimate accommodation of passengers, the racing decks appeared indispensable; therefore, it was an attempt to reconcile two objects, which were in a very great measure incongruous.

529. *Chairman.*] But I suppose as packets they are well adapted for the purpose?—As packets, nothing can be better.

530. What number of passengers will they accommodate?—There are nine cabins, very good ones. The captains are allowed to take passengers on their own account; the Company did not wish to derive any advantage from that, or expect it; they had wished it, but the passengers were limited to 18 persons in all, servants included. The number, I believe, they both took; the Atalanta certainly took that number, and the Berenice likewise, I think so.

531. And is that the extent that you would say these vessels would carry between Bombay and Suez?—It depends on the accommodation people would put up with. The accommodation is about equal to that of the Dundee and Perth Scotch steamers, which carry between 100 and 200 passengers, if they choose to sleep on the sofas in the saloon.

532. Lord *Sandon.*] When they were full of coal, what room had they besides for cargo?—No room for cargo; cargo never entered into the speculation.

533. *Chairman.*] Could you form some estimate of the number that could be conveniently carried in these vessels?—There are nine cabins, each of which will accommodate two persons, I should think not more, not with any comfort.

534. And is there a large dining-room or cuddy in which people could hang up?—Most beautiful rooms they are.

535. Lord *Sandon.*] There would be room for light cargoes, would there not, besides the coals?—For treasure or articles of great value and small bulk; these vessels carried out treasure; the Atalanta carried a great deal upon the captain's account, and upon his own responsibility.

536. Mr. *Crawford.*] Articles of great value and small bulk were carried to the Isle of France?—They would carry to the Cape also. There was a great deal carried to the Isle of France.

537. *Chairman.*] But there is no room properly for cargo in these vessels;—No; cargo was left out of view. If you made a short run and took 100 tons of coals, you would take 150 tons of cargo. The Berenice would carry more coals than the Atalanta, and she requres more.

538. Lord *Sandon.*) If she had not had head winds between Fernando Po and the Cape of Good Hope, she would have had a great deal of spare road?—Yes, a great deal; she had at other stations spare coal, in fact the Berenice did not find it necessary to stay at Teneriffe at all. The captain ran in there, it was Good Friday, and he said he found the Spaniards all in a state of insanity, beating the image of Judas Iscariot with cudgels, and refusing to do anything, and therefore, as he found he should be detained many days, he went on to Mayo, having coals enough to carry him there, and to have some left still.

539. *Chairman.*) Then you consider five vesssels necessary?—Yes.

540. Of course the same establishment of five vessels would carrry the communication to Point de Galle and to Bombay?—That is a greater distance rather, I think not material, the same would do.

541. Well then, I will ask you how many more steamers would be requisite to carry on to Calcutta from Point de Galle, or between Point de Galle and Calcutta?—I would allow one steamer for every 15,000 miles. The distance from Point de Galle to Calcutta is 1,170 miles in round numbers, we will call it 1,200, one steamer would about do that, one runing one way and one the other; it would require two from Point de Galle to Calcutta. A steamer will last much longer if not overworked. It could do more than 15,000, but it is not advisable that it should.

542. Then the extra expense will be two steamers?—Two steamers to Calcutta

543. Supposing you go to Calcutta instead of Bombay, it will require two additional steamers?—Yes.

544. Now we will have the expense of these vessels; in your former examination, you estimated the expense of each vessel very much of the same tonnage and power?—Yes, 600 and 200.

545. You estimated the annual expense of each vessel at 25,000l.?—Yes, I did.

546. That is, taking in all expenses, I suppose?—Taking all expenses, including the sinking fund for building the vessel and replacing it when it is worn out.

547. Mr. *Crawford.*] All expenses to keep a steam-vessel at all times efficient?—Yes.

548. *Chairman.*] But that was also on the understanding that it was done in the most economical manner?—Yes; and I gave the reasons.

549. Before you go to that, I will just ask you if your present estimate is the same; do you think the expense now would be the same?—I do not see any reason to make any material difference in that estimate.

550. You further say, that in India you think it would be double that expense, I think you stated that?—Yes; I spoke of that in round numbers.

551. That is, 50,000*l.* a year for each vessel?—All the outlay, the fuel, the establishment, and everything of that kind, that is, all Indian; I only said the prime cost of vessels built in India would be about double the expense of vessels built in England.

552. Lord *Sandon.*] The prime cost?—Yes; and there was another point, that is to say, if the fuel was supplied from India to the Red Sea, instead of direct from England to the Red Sea, I think the expense of that would be double. If it went to India first, and then to the Red Sea, I think the expense of that would be double. If it went to India first, and then to the Red Sea, I think it would be double to what it would be if it were sent from England to the Red Sea, not merely on account of the additional freight, but also on account of the deterioration and waste.

553. Mr. *Wynn*] Do you not allow for any supply of India fuel?—Not of native fuel.

554. Only that which has been tried sufficiently and succeeded?—The Burdwan coal, that must be sent round from Calcutta, but that was not above half the power of the Llangerrick coal, and the freight from Calcutta must always be very great. I have seen it stated in the Indian papers (I know nothing of it officially) that 50 rupees a ton was paid for freight from Calcutta to Malta, for Burdwan coal; there is only the Burdwan coal that is available from India.

555. You consider the Burdwan coal the only coal that has been discovered in India, which is available for the purposes of navigation?—Yes.

556. Mr. *Crawford.*] Do you know anything with reference to what it may cost to be brought too Calcutta from Burdwan?—I do not know exactly, but it is very cheap.

557. Mr. *Mullins.*] What do you think is the probable cost of fuel in India, in places where they take it in ballast?—They will only take it in ballast from their own ports of loading: the Liverpool vessels will only take Lancashire coal; Lancashire coal does very well to run from Liverpool to Ireland, or any part of the continent of Europe, but it does not do for a long sea voyage, which is the thing you have in view.

557. Therefore, Llangerrick is the only coal you seem to approve of?—It is the only coal that combines sufficient power in the bulk that any of our steamers can carry, or any steamers I know, to run the distance the Atalanta has run.

558. Lord *Sandon.*] Would not the Burdwan coal do for the run between Suez and Socotra?—Yes, it would for that distance.

559. That is the same as the communication between Liverpool and Alexandria?—Yes; but the freight would be great.

560. That you will send out less combustible power in the same bulk?—What you want is combustible power; I doubt if a Liverpool vessel would take it to Mocha; I should think, any coal going that way would be ground into powder; there is landing and loading it on the camels' backs, and trotting across the desert, and depositing the fuel and putting it again into the steamer, and if anything but dust got into the steamer I should be very much surprised.

561. It could not be laid down at Suez for less than 6*l.* a ton, I suppose?—I do not see the necessity for coals at Suez at all, except in cases of emergency; it would be much better to have a little port two-thirds up the Red Sea, and then let the steam-vessel run from that to Suez and back, it would be much cheaper. It would be much better to let the Atalanta and Berenice run up the whole length of the Red Sea and back again without taking in any coal at Suez; only having a small depôt for emergency

562. Mr. *Mullins.*] But you think it probable that certain vessels may take Llangerrick coal in ballast?—The only difficulty is to get them to the port of loading.

563. Assuming them to take out Llangerrick coal in ballast, what do you suppose would be the cost in India per ton?—I should think they would not take coal in any quantity for less than 20 *s.* as ballast or dead weight, or whatever it may be called. We have had it done for 9 *s.*, but I should think the arrangement could not require less than 20 *s.*

564. What do you suppose would be the extra cost of conveying that coal from any one of the Indian ports to any of the depôts in the Red Sea?—That is exceedingly variable.

565. Take Socotra for instance?—I do not think it makes much difference whether you take it at Socotra or Mocha; but that I have not the means of knowing; we have not got official accounts clear enough; but as I have already said, it cost 50 rupees a ton from Calcutta to Mocha; moreover, we know that the coals of the Hugh Lindsay cost 5,000 *l.* each voyage, a very great part of which must have been freight; but we have not the means of making official returns of the exact rate of the freight of coal from Bombay to the Red Sea

566. Do not you think if there was an establishment of regular communication with the different ports in India, that the price of coals would diminish in proportion?—I should think it would rather increase.

567. On what principle?—Because the spare freight, which is the only freight worth reckoning upon, is limited; there was a great deal of evidence to that effect respecting the available dead weight tonnage before the Salt Committee; the result of that was, that they could go from Liverpool (and when it was examined I think it was proved they had not so much to spare, but that was their statement,) with 10,000 tons in the year, at 20 *s.* a ton; but when we examined the quantity of tonnage, the total amount of tonnage from Liverpool of all kinds, it does not appear that the dead weight tonnage bore that proportion to it.

568. Lord *Sandon.*] The demand for the whole of that tonnage would naturally raise the price of freight?—Yes; but then the freight is a very small part of the charge; the landing and the reshipping are very enormous charges. We had a charge of 1,967 dollars on one landing and re-shipment at Aden. It could not have been above 100 tons. The landing and the re-shipment of the coals in this station which we have employed, and where it is likely to be very much cheaper, much more easily managed at any rate than in the Red Sea station, has been about 20 *s.* a ton.

569. *Chairman.*] But of course, that would be prevented hereafter?—All that admits of remedy, but though the coals have cost 7 *l.* a ton, I think if we assume by good management we could get it for 3*l.* 10 *s.*, it is as little as we should be able to get it at.

570. Have you had any communication with Colonel Campbell on this subject?—No; not much communication from him.

571. You have had no communication with him about coals?—The only communication I have received from him lately is, stating that the Bombay government had written to the Pacha of Egypt to allow them to make Cameron a coal depôt, and that he had acceded to the request. Cameron, I presume, is a very much better station than Mocha; Mocha in fact will not do for these steamers, because Captain Wilson says, no vessel drawing more than 10½ feet of water can go into the inner anchorage at Mocha; and the outer anchorage is exposed to so great a swell during a very great part of the year, that the taking coals on board is a matter of great difficulty, and often impossibility.

572. Lord *Sandon.*] What is the draught of these vessels?—About 14 or 15 feet; 16 the Atalanta is, when quite full, but she has one (which does not properly belong to her draught she has one foot under her bottom, which is called a hollow guard-board. She had too little beam, this was adopted as a remedy for that.

573. *Chairman.*] If the steamers from Calcutta could be worked with the Burdwan coal, the expense of working them would not be so great?—No.

574. Mr. *Mullins.*] Should you think it advisable to limit the tonnage of any future vessels to be built to the tonnage of the Atalanta or the Benefice, and the horse power?—No; I think the larger a steam-vessel is the more work she will do, and the more economically she will do it; I have not the least doubt that 160 horse power will consume as much coal as a 200 horse-power, for if you take it in round numbers at 20 tons a day as I did, which is one ton for 10 horse power, and if a 160 power vessel will go 160 miles, and a 200 power vessel will go 200 miles, it is very clear the consumption per day is the same, and the time is cost, and that, though I state it theoretically, is a matter of fact proved by experience.

575. You are aware it has been recommended to have the tonnage of vessels so high as 1,000 tons and 250 horse power, should you think it well to have them so large as that?—I should think a 1,000 tons vessel ought to have more than 250 horse power; that is only one to four, that is too little.

576. How much more?—One to three and a half on every 1,000 tons; from one to three, and anything below 700, to 2½.

577. Do you suppose vessels of such a size could find room for a certain number of tons for cargo as well as fuel and passengers?—Certainly; I do think they could.

578. To what extent do you suppose?—Not to a very great extent; to the extent of 100 or 200 tons perhaps.

579. Should you think so much as that?—One hundred tons, I should say, certainly they could; if you limit the run to such runs as the Berenice and the Atalanta take, and if, instead of the proportion of one to three, you have a proportion of one to three and a half, you will gain half the additional quantity.

580. What number of passengers do you suppose a vessel of 1,000 tons could conveniently and with comfort to themselves accommodate?—I do not think she could accommodate a very great number in any case; probably she might carry double the number of the Atalanta, 30 persons in all comfortably, but I do not think she could do more than that.

581. And independent of their luggage you suppose there will be 100 tons to spare for cargo?—Yes; in a vessel of 1,000 tons measurement, and the proportion of one to three and a half horse power for tonnage.

582. You are also of opinion that a vessel of a larger horse power and larger tonnage will not be so liable to wear and tear as a smaller vessel?—Certainly, up to a certain extent.

583. *Chairman.*] You have estimated the annual expense of each vessel at 25,000*l*?—Yes.

584. You have done it in the most economical manner?—Yes; built in England and the coals sent from England; but I certainly was in hopes, as far as I was concerned, that our building the vessels in England would stimulate the Indian government to carry on their own operations more economically, and pay more attention to it.

585. I have always understood they can build in Calcutta as cheap as in England, and that it is the repairs that cost so much more?—We have not found that by experience; the repairs of the Enterprize cost more than a new vessel would have done; the Hugh Lindsay cost more than the Berenice.

586. At Bombay?—Yes.

587. Mr. *Young.*] Can you give the Committee any information as to the relative expense of building a vessel at Calcutta and in England—No, not in all its technical details.

588. The price per ton at which they contract to build ships?—No; they say they can build them cheaper than we can build them in England.

589. Lord *Sandon.*] Do you happen to know at what rate per ton vessels are generally built at Bombay or Calcutta, putting steam-vessels aside for the moment?—No, I do not; I only look to the general fact, that some steam-vessels of the same size, including engines and so on, cost more building there than here.

590. *Chairman.*] Which was the highest contract for the Berenice or the Atalanta?—It was the same as nearly as possible; there was this difference, the Atalanta was contracted for (the vessel) with Wigram & Green, and the engines with Maudesley & Field, and the aggregate amount of the contract was somewhat less than 29,000*l.* Berenice was contracted for with Mr. Robert Napier, and the aggregate amount of the contract was 29,000*l.* exactly.

591. Mr. *Young.*] What were the respective amounts of the ship builder's and the engineer's accounts for the Atalanta?—The engineer's of the Atalanta were 15,000*l.*, and double mechanical stores 1,300*l.*; the hull would be about the difference. It was 28,800*l.*; that made up the aggregate; if you deduct those two sums you will have the hull within a few pounds.

592. That is, 12,500*l.*?—That is as near about it as possible.

593. What was the tonnage of the Atalanta?—Six hundred and sixteen tons.

594. *Chairman.*] How much would that be per ton?—Twenty pounds per ton; that included more than the hull; it included a good many things.

595. Mr. *Young.*] The entire cost of 28,800 l., I presume, included the whole of the sea equipment, masts, yards, sails, anchors and other stores?—Yes, the whole; it included the complete sea equipment.

596. Mr. *Mullins.*] I find it stated by Dr. Lardner, that a vessel of 1,000 tons and 250 horse power can be constructed in any of the outports for 30,000 *l.*, does that agree with your opinion?—Yes; with iron boilers, and built by public advertisement for competition, it could be constructed for that or less.

597. You are of opinion it would be extremely improper to use iron boilers, in such vessels intended for long voyages?—Yes.

598. Mr. *Young.*] For what reason?—The copper boilers last longer, and the longer you can keep any part of the machinery of a vessel undisturbed the better.

599. Mr. *Mullins.*] Is there no other reason that you can assign for giving a preference to copper boilers over iron ones ?—Nothing but their duration; I do not attach much importance to anything else.

600. You are not aware that they are less liable to accident ?—No; I am not aware of that.

601. You have not turned your attention to that ?—Yes; I have turned my attention to that.

602. Mr. *Young.*] Are you acquainted with the use of Hall's patent condensers ?—I have paid a little attention to it; among practical men there are two opinions respecting them.

603. Have you ever seen the Hercules ?—No; but I intend to see her when she comes home.

604. If it were proved to you that the water that was placed in those boilers nine months before, remains the same water, having been in constant use, without that being fresh water and consequently free from any of that adhesion of saline particles which cause the destruction of iron boilers, would it not induce you to consider they were more advantageous than you now imagine them to be ?—So far I believe it is proved that they would be advantageous, but there is greater weight and greater complication; I know as a matter of fact, though I dot not know why, that the general Steam Navigation Company had them in one of their vessels, and took them out again. I know that as a matter of fact, but I do not know why.

605. Mr. *Mullins.*] Are you acquainted with Collier's patent boilers ?—I have seen drawings of it. That is another complicated system.

606. So complicated, do you think, as to render it inexpedient to adopt it ?—I think it would be inexpedient for the East India Company to adopt it, until it was tried in stations where the means of repair were more available.

607. Have you heard among scientific men any opinions injurious to the patent boiler I speak of ?--No.

608. Have you ever heard any opinions in favour of it ?—No; I have heard very little about Collier's. I do not know anywhere where it has been tried. I know where Hall's has been tried, and learnt some results about it; but I do not know anywhere where Collier's boiler has been tried, that I have not had the means of getting information about it.

609. Mr. *Young.*] Are you acquainted with the principle of Hall's condensers ?—Yes.

610. Mr. *Crawford.*] But in point of fact you would not recommend any experimental inventions with regard to steamers for India ?—No.

611. I mean those which have not received decided approbation here ?—The finest theory is Howard's vapour engine; that has succeeded to a certain extent.

612. *Chairman.*] What is your opinion of Socotra as a depôt ?—In the first place I do not see that we want at all; I am only speaking from memory, because it is some time since I read the papers respecting it; but the general impression I have is this: that it has two good roadsteads, but no harbour; one available for the north-east and the other for the south-west monsoon; but it was taken possession of and abandoned in a hurry, upon the supposition that it was very unhealthy, and that supposition was afterwards supposed to have been too hastily adopted; still, as it is only open roadsteads, I should doubt its being a good depôt under any circumstances.

613. You do not know that it is not ?—No.

614. The fact is, you do not know whether it is or not a good depôt ?—I know it is only open roadstead; it may be a very good depôt.

615. However, you cannot speak to the fact ?—I would not venture to say it is.

616. You do not know it is not ?—I do not know it is not, but my impression is not favourable to Socotra.

617. What are proper depôts between Suez and India ?—The best depôt, in my opinion, is the island of Perim, in the Straits of Babelmandel.

618. Mr. *Mullins.*] Do you speak from personal knowledge as to its practicability ?—I speak from the evidence given before the last Steam Committee in 1834, and from what I have seen on the Indian records.

619. Can those records be obtained that you speak of ?—Yes; they are all to be found in the evidence given before the Steam Committee in 1834.

620. There are no additional ones that have been introduced ?—No; I think nothing more than that is sufficient to enable the Committee to form a judgment on the goodness of it. The next best, I think, is the island of Camaran.

621. Mr. *Bagshaw.*] You do not speak of these things of your own knowledge ?—Only from having studied them; and I wish it to be distinctly understood that any opinions I express are my opinions, and not those of the Court of Directors; I have expressed one or two already, which are at variance with the plan they have adopted; Mocha I consider to be decidedly bad for the reason I gave, that that does not allow vessels of sufficient draught of water.

622. Mr. *Mullins.*] Why do you think Socotra could be dispensed with ?—I conceive that either the Atalanta or the Berenice cannot run in the north-east monsoon to Perim or to Camaran. But I conceive that in the south-west monsoon, if that has not been very greatly misrepresented, they could not run to Socotra.

623. Do you think it would be advisable, under any circumstances, that those vessels, or larger vessels, should run so long a course when there was a possibility of their taking a shorter one ?—I think it would be better that they should run to some very good and available station. The difference is not so very material in the north-east monsoon between Socotra and Perim as to make the difference between the two a distance of any consequence.

624. Have you any idea what the distance is ?—It is about 600 miles, I think.

625. And to Socotra 200 miles further ?—No; I say from Socotra to Perim is 600, but Camaran is near 200 miles further, 165 nautical miles.

626. Then supposing it was shown that Socotra was a good depôt and not liable to any of those objections which you seem to allude to, should you not think it more advisable to use Socotra for a depôt than to advance further to Perim or to Camaran ?—Yes; I think it is not desirable to have long runs if it can be avoided; at the same time, long runs save time, provided they do not overwork the vessel in the time.

627. Then you think it would be better to lose a little time than overwork a vessel, and thereby create a vast deal of expense?—Certainly.

628. And the necessity of laying her up oftener than under other circumstances would be necessary?—Yes; there is abundant depth of water in Perim; it is a perfect harbour.

629. *Chairman.*] Is there not some difficulty in getting into it?—Not for a steamer, there can be none.

630. Does not the wind blow very hard there?—The wind blows very hard at the entrance, but I should not think that would affect a steamer in a narrow sea. I have another objection to Socotra for the south-west monsoon, and that is, that it is too far to the north; you will find in all the evidence that was given before the Committee, in 1834, respecting sailing vessels that have gone to the Red Sea in the south-west monsoon, that they kept as close as possible round Cape Guardafui. Now a steam-vessel leaving Socotra would be out in all the force of the wind, and would have either to run to the coast of Africa under very disadvantageous circumstances, for which she would go out to Socotra and then back by the African coast, or else she must go upright against a head-wind all the way to the Gulf of Aden. For the south-west monsoon, I should think Socotra not an advisable station; for the north-east, I dare say it would be a very good one.

631. Mr. *Mullins.*] But supposing it was only advisable to use it in the north-west monsoon, do not you think it would be better to have it for a depôt than to dispense with it altogether?—I think it would be better to have it most certainly, though I do not think it the best depôt you could choose, as far as I know, and I might alter that opinion on reading the papers over again, but yet I think it is most desirable to have it as a depôt; I think we could not have too many depôts, because it is only for depositing coals which would be used on an emergency, and experience would point out which was the best. The choice is evidently very limited; Socotra, Perim, and Camaran are about the whole that are very good.

632. *Chairman.*] Perim would be the first?—Perim has no water, it is a mere sandy rock, that is a disadvantage to it. But a very small establishment would be necessary, and I should think the steamers themselves could feed it.

633. The second would be Camaran?—Yes, that being only 165 miles from Perim. It would not be necessary to have them both; but Perim appears to possess so many advantages in its position, and its harbour, and its distance, that I think it would be very desirable to try to form a small establishment there.

634. If it were thought necessary that we should possess Socotra, does there appear to be any difficulty in obtaining the cession of that land?—As far as I remember from the papers, none at all.

635. Well, now we will take the time: in 1834 there appeared to be a doubt whether the south west monsoon could be overcome by steamers; I suppose there is no doubt any longer upon that point?—There is still a great deal of doubt among practical men on the subject, arising from the length of the run. I do not find any practical men very adventurous; the most adventurous men against stormy winds are the people of Liverpool and Glasgow; they do not make any doubt of the power of a steam-vessel to surmount any opposition in the south-west monsoon; they suppose the number of miles that a steamer could run against it in a day would be greater than she would be able to carry coals for to the first available station. The best chance of standing against the south-west monsoon would be, if it were possible to find a depôt, immediately round Guardafui. Now, I do not know that there is not one: there is no evidence that there is not one; there is the island of Perim *(handing a map to his Lordship).*

636. I suppose there is more searoom than about Socotra?—No; those who speak of it in that evidence speak of it as being perfectly land-locked.

637. Is not this rather about a depôt than about the passage from Bombay, because I am now talking of the south-west monsoon?—Yes; but a depôt for the south-west monsoon should be, if possible, immediately under Cape Guardafui.

638. There was a doubt whether a steam-vessel could successfully encounter the south-west monsoon dead an end; does that exist now?—It does not, provided you have vessels of great tonnage and power; you must have that; that is essential.

639. Are the Atalanta and the Berenice equal to it?—I think not; the Berenice might be, but I think the Atalanta is not.

640. But supposing a communication from Bombay in the south-west monsoon, how would you make the passage, not being able to go dead an end; might you slant away to the southward?—You could not go more than six points of the wind; but I would make a course within six points of the wind; I would not run down to the other point of the Line, as some people propose to do.

641. How far would you go in that direction, would you take in the strongest part of the south-west monsoon; what course would you take when you leave the Bombay harbour?—Some propose to run to the northward first, then to make a very long run to within two or three degrees of the Line. I would run out of the harbour and make courses, not very long ones, within six points of the wind.

642. Mr. *Crawford.*] Lines as near in a direct course as possible?—Yes.

643. *Chairman.*] Would you go exactly like a sailing ship?—Exactly so; or else I would go dead an end, which is what the Scotchmen would do. The Glasgow men would go right ahead against any wind that blows. The Atalanta has gone upon that principle, she went right ahead always.

644. Under those circumstances, what time would vessels take to go to Socotra?—From Bombay.

645. Yes, from Bombay?—They would be about 12 days, I should think.

646. Mr. *Young.*] What is the distance?—Twelve hundred miles.

647. *Chairman.*] But that would bring the coals of one of these vessels very near to their total consumption? It would; but I think it would be possible to do it, if she could go five miles an hour, which is what I calculate. I think it would be possible, but I would rather run to Guardafui and have a depôt immediately round the point; there is an island there.

648. But the distance would not be less to that point?—The distance would not be less.

649. Well now, would you take the other mode you have put, that other persons suggest?—I would not take that plan at all of running to the northward, and then to the southward, and then along the Line and then up to the northward again.

650. Mr. *Young.*] Though some have recommended it?—Yes, some men of great experience; but I think the time it would take would frustrate all the objects of an expeditious communication. No doubt that is practicable.

651. But you consider the preferable course to be to have vessels adapted for encountering the severity of the monsoon, and then steaming as nearly as the circumstances in which you might be placed would permit?—Certainly; with sufficient tonnage and power, if you do not exceed 1,000 tons measurement, and 300 horse power within that limit, you might go against the south-west monsoon, that is my opinion.

652. *Chairman.*] Now it is 1,600 miles from Galle to Socotra?—It is rather more than 1,600, very near 1,800.

653. And the passage, in point of wind, would be more favourable?—Much more favourable, it would be almost a beam wind.

654. How many knots an hour do you think the Atalanta and the Berenice would go under those circumstances?—I should think they would go their usual rate.

655. Two hundred miles a day?—Yes.

656. Then Galle to Socotra would take eight days and a half?—Yes.

657. Well, now let us go from Galle to Calcutta and back; that is, I believe, we will stop at Madras.—That is 540 to Madras, and 720 to Calcutta.

658. Mr. *Crawford.*] Now where do you start from, and which monsoon?—The south-west monsoon.

659. *Chairman.*] There is much greater facility in the bay of Bengal steaming against the south-west monsoon than in the European sea, because it does not blow home; by keeping near the shore you have not the wind, only the swell against you?—Here is the chart of a voyage from England to China.

660. Well now, from Calcutta to Galle against the south-west monsoon?—If it be a true south-west wind, it will be a beam wind from Galle to Socotra; but it is not, it is more westerly.

661. Mr. *Bagshaw.*] Now I ask you whether, as you approach the African coast, the winds are not found to change more to the south than in centre of the bay in the European sea?—The winds are south very near the coast of Africa, below Guardafui; but beyond Guardafui they blow right up and down the Gulf of Aden. There is a due westerly wind in the Gulf of Aden, going south to Bombay; in the south-west monsoon the wind falls away.

662. Mr. *Young.*] Are you acquainted with the effects of the south-west monsoon on the navigation of the bay of Bengal?—I will state one circumstance; the Enterprise went from Calcutta in the south-west monsoon, to go to Bombay, for the purpose of making the first voyage to the Red Sea; she got to Point de Galle she could not round that point, and she went back to Calcutta.

663. What time did the Enterprise occupy in the performance of the passage from Calcutta to Point de Galle?—That I cannot tell you; I only know that simple fact; you must have a powerful vessel to go round Point de Galle.

664. In what time do you consider a well adapted steamer would be capable of making the passage from Calcutta to Point de Galle against the south-west monsoon?—I think that under any favourable circumstances they will always make their 200 miles; and under decidedly adverse circumstances they will never make less than 150, excepting, as I said before, if south-west monsoon has that tremendous power which is ascribed to it; through the whole distance I think it will not make 150 miles a day.

665. Then I understand that under favourable circumstances you are of opinion that the passage might be made in six or seven days, and under those unfavourable circumstances, in nine or ten; is that so?—Yes, certainly.

666. Mr. *Mullins.*] Now, looking to vessels of 1,000 tons, with 300 horse power, within what period do you think they would make the same passage?—I do not think steam-vessels ever go more than 150 miles a day, 250 for a small one, and I think a very large and powerful steamer would make 200 miles good under unfavourable circumstances; all but the most unfavourable. If you could get 150 miles a day against the south-west monsoon, then you would do well.

667. *Chairman.*] If it does not blow home?—No; I should think you might do that in the bay of Bengal.

668. Then in the north-east monsoon?—That is nothing for a steam-vessel.

669. What would you take as an average?—I would take 200 miles a day in the north-east monsoon.

670. Both sides 200 miles a day, backwards and forwards?—Yes.

671. Mr. *Young.*] What time do you imagine is occupied in taking in coals at Point de Galle?—I do not know; we have been very much out in the calculation of the time occupied in taking coals in. These steamers will not round the Cape, the detention is very great; but the best plan would be to have moderately long runs, and to change the steamer at every station.

672. Suppose the Atalanta or the Berenice to be dispatched from Calcutta, what are the stations that you would recommend for taking in coals during the south-east monsoon?—Under any circumstances they would run down to Point de Galle. I do not see any necessity for having anything nearer than that, and that you must have.

673. That you have already calculated as occupying upon an average eight days?—Yes.

674. How long would you give a vessel at Point de Galle for taking in a fresh supply of coals?—I am not sufficiently acquainted with the capacities of Point de Galle to say that; we have always been mistaken in our reckoning in point of time.

675. But from the best information you have?—Five days; but I would save those five days by having another vessel ready.

676. We have understood you, then, I think, to express it as your opinion that from Point de Galle to Socotra might be accomplished in eight days more?—Yes; but I will say to Guardafui; I would rather run there than to Point de Galle in the south-west monsoon; I wish to keep that in view, if a depôt can be found. If you touch at Madras you may have coals there, if you want them, but you do not want them; you cannot always touch at Madras.

677. *Then it appears, if I understand you correctly,* as the result of your estimate, that during the prevalence of the south-west monsoon a passage might be made from Calcutta to Guardafui or Socotra in about the same time as you calculate it would occupy to make a passage from Bombay to those same points; is it so?—No; I think not.

678. Did I understand you correctly that it would occupy 16 days from Bombay to Guardafui or Socotra steaming in the south-west monsoon?—What I should say, and what I meant to say is, I should think a vessel would go against the south-west monsoon from Bombay to Point de Galle at the rate of 120 miles a day, and from Point de Galle to Gaurdafui at the rate of 160 miles.

679. From Bombay to Guardafui is what distance?—One thousand two hundred miles. If you take 1,660 miles at 160 miles a day, that is 10 days and a half, say 11 days, I think they could go from Point de Galle to Socotra in 11 days; then take 1,100 miles, at 120 miles a day, from Bombay to Socotra, I have always understood it to be 1,200; but I am speaking of nautical miles, which are not always adhered to.

680. But you are speaking of them in all instances?—Yes; when I speak of land distance I speak of nautical miles also. I think it is not more than 11 days, if so much, and that at 120 miles a day. Socotra was always stated in the Indian papers, when there was so much discussion about it, as being 1,800 miles from Point de Galle.

681. What period would be occupied by one of the vessels you before adverted to in making a passage from Calcutta to Madras during the south-west monsoon?—Four days, I should think.

682. And what from Madras to Galle?—I should think it would be about the same, about five days: about five or six days. I should think it would take ten days the whole passage.

683. It would seem to follow then, from the evidence you have now given, that the time that would be occupied in passing from Calcutta to Socotra would be 21 days during the south-west monsoon, exclusive of any time that might be lost in taking in coals at Galle, or detention at Madras?—Yes.

684. *Chairman.*] What is the time occupied from Bombay to Calcutta by Dawk?—Ten days, sometimes 12 and sometimes 14; I am speaking of the shortest time when I say 10 days.

685. Of course, during the rains it would take a great deal more?—A great deal more; yes.

686. Mr. *Young.*] Then 21 days being occupied from Calcutta to Madras, and from Galle to Socotra, it appears that it would take about the same time if letters were dispatched overland from Calcutta to Bombay, and from thence forwarded to Socotra in the south-west monsoon?—It would, I suppose.

687. But in the return, you would have great advantage on the Bombay side?—In the north-east monsoon you would have great advantage.

688. During the prevalence of the north-east monsoon, what time do you think would be occupied in passing from Socotra or Guardafui to Bombay?—Two hundred miles a day. I have no doubt they could run that. I have not the least doubt of their running that.

689. That would be six days then?—Yes, six days to Bombay, and nine days to Galle.

690. And from Galle to the Bay of Bengal, during the north-east monsoon to Madras?—It would only make 90 miles difference; the deviation from Galle to Madras that is 540 miles. Three days would be enough to allow for that.

691. And from Madras to Calcutta?—That is 720; four days, I think that is allowing quite enough.

692. That would be 16 days to Calcutta, by Galle and Madras?—From Socotra, yes.

693. Mr. *Crawford.*] Without detentions?—Without detentions.

694. Mr. *Young.*] And by Bombay you would, I presume, add the 10 or 12 days for the passage overland to the six?—Ten days you must allow.

695. How long is the average communication by land?—The shortest possible communication is eight days.

696. What period would you add to the passage from Socotra to Bombay, for the transmission of letters from Bombay to Calcutta, during the north-east monsoon?—About 11 days; I would take one day to get them ready, and 10 to send them.

697. Then letters would, in your opinion, be conveyed from Socotra to Calcutta by Bombay in 15 days?—Yes, but it might be done in eight.

698. What do you think would be a fair average calculation?—If it were worth while to run a race, I should say it might be done in eight days.

699. Under ordinary circumstances, would 10 days be proper?—Yes.

700. Then it would occupy 16 days by Bombay?—Yes.

701. And by your former statement, if taken by Galle and Madras it would occupy, I understand you to say, nine and three are 12 and four are 16?—Yes.

702. Which is the same time with the addition of any time that might be lost in stopping either at Madras or Galle?—And exclusive of delays.

703. Mr. *Bagshaw.*] I wish to call the attention of the witness to the situation of Madras; the time it takes to convey letters from Socotra in the north-east monsoon to Bombay is six days by a steamer; now what is the time it takes to convey letters by Dawk from Bombay to Madras?—I cannot speak to that exactly, but I should think it would not take more than to Calcutta.

704. Then in fact that would be 16 days to Madras?—Yes.

705. Then by steam all the way from Socotra by way of Galle to Calcutta, according to your former statement, it would only take twelve days?—Yes.

706. Then there would be a saving in time to Madras of four days?—There would.

707. Mr. *Young.*] In your preceding evidence, referring to the transmission of letters overland from Bombay to Calcutta during the prevalence of the south-west monsoon, you stated that it would take 10 days?—I do not remember that I stated that; I think that is too little.

708. Do not the rains prevail during the period of the south-west monsoon?—Yes; part of that time it must be impassable, which must cause a detention.

709. Then considering the impediment that would be likely to arise from the prevalence of the rains during the south-west monsoon, what time do you think now might be fairly calculated for the com-

munication between Bombay and Calcutta by land at that period?—Sixteen days perhaps; it ranges between eight and sixteen, between the possibility of the greatest expedition and the chance of the greatest impediments.

710. Mr. *Bagshaw.*] Can you state the time it takes to convey letters by Dawk from Bombay to Calcutta?—*No; the force of the south-west monsoon in its whole range does not extend over more than six months. The force of the south-west monsoon, on the Bombay side, is generally considered as limited to four months.*

711. *Chairman.*] Well now, we have got the expences; we have got the 25,000 *l.* a year for each steamer per annum, and five steamers, that is 125,000 *l.* to Bombay; now we will talk about the returns, and we will talk of Bombay only; have you any memorandum of that?—I have no memorandum at all, except this little table of distances and these maps.

712. What are we to set off; what are likely to be the receipts by Bombay; what by Calcutta; and what have we to set off in the different routes against the expences?—A very little I should think; I should think from passengers we would get nothing. I do not think it would be a matter of profit to the East India Company in any way whatever, for the conveyance of passengers.

713. Might they not make it so, if they chose?—They did not think they could in the Atalanta and the Berenice; they gave them away to the captains, the only object was experimentaly to see the result.

714. Mr. *Mullins.*] What sum do you think it would be advisable to charge a passenger by that route, the entire distance?—Why, the advisability for a profit ought to be very considerable, if you look to profit.

715. What do you think it would be advisable to charge; you are aware the charge by the Cape of Good Hope is 120 *l.*, what do you think it would be advisable to charge by the other?—One hundred and fifty pounds.

716. *Chairman.*] What do you expect will be the returns from passengers between Suez and Bombay?—There are two ways of getting a return; in the first place, if you turn yourselves into hotel-keepers, and find the passengers with everything, and charge so much money; in that case, charge what you will, my opinion is, the East India Company would get no profit at all. The other way is to allow the passage to the captains, and let them have a proportion, one-third, or whatever you may fix upon for their carrying the passengers at their own cost and in that way; I think you might get some money, but not much, but a great deal of complaint of the mode in which they were treated.

717. Mr. *Bagshaw.*] But experience does not bear out that fact, inasmuch as captains of ships take passengers upon the latter terms that you have mentioned, and give very great satisfaction, by way of the Cape of Good Hope?—But it appears to be the reverse by way of the Red Sea.

718. How so?—On the last voyage of the Hugh Lindsay there were great complaints by the passengers against the captain in consequence of the miserable accomodation of fare.

719. That was not a vessel calculated for the purpose?—No, but the fare; they did not complain of the vessel, but they complained of their treatment.

720. *Chairman.*] But why cannot the same system be adopted in the steamers?—Now, I will suppose that overruled, and the charge to be 150 *l.* for a passage; they would object very much to give 150 *l.* to go to Suez, when they can get to England for 120 *l.*

721. Why charge them 150 *l.* by the shorter route, and 120 *l.* by the other?—Because the expence of sending a steam-vessel from Calcutta to Suez is very far greater than that of sending a vessel from Calcutta to England.

722. Looking to the charge to a passenger with reference to the provisions to be found him on his way, what do you think would be a fair charge?—The Atalanta originally charged 120 *l.* for the best cabins; they afterwards reduced it to 100 *l.*, and it is now 80 *l.*

723. But that was only a certain distance?—That is 3,000 miles, Calcutta being 5,000. I should think 150 *l.*, of which only 100 *l.* goes to the captain, on the supposition we just made of two-third; I should think 150 *l.* would not be too much to charge.

724. One hundred and fifty pounds for the entire passage from there to England?—No, from Calcutta to Suez. Suppose you take 120 *l.*; 150 *l.* was what I thought myself.

725. As a proper remuneration for the passage, then, you will have on an average 20 passenger; you will have no more.

726. Mr. *Mullins.*] That is to say, your opinion is, it would cost 100 *l.* for providing a passenger comfortably during that passage?—Yes; that is to say, to induce the captain to take the risk and expense on himself in such a way as to satisfy the passengers and prevent such a round-robin as *was* signed the other day, to provide passengers of a steam-vessel with the same degree of comfort and munificence as that with which the Atalanta passengers are provided; but for the calculation, it would be better to take the higher rate, because if you have 50 *l.* profit, and that is scarcely worth reckoning upon, of course, *à fortiori*, if you only have 30 *l.* profit, it is still less worth reckoning upon. These captains would not have taken the passengers on any other terms, either to provide for themselves or they to provide for them and give us nothing; they would rather have taken the vessel out without passengers at all. If you have 20 passengers a month each way, and you have 50 *l.* from each passenger, that will be 1,000 *l.*; so that you would get about 2,500 *l.* by passengers.

727. *Chairman.*] Are you talking of Bombay?—No, I am talking of Calcutta now. You are talking of one way; you are not going to have both Bombay and Calcutta. I doubt if you will have so many passengers as that from Bombay; you would not have 240 ladies and gentlemen from Bombay every year, and back to Bombay every year; that is out of the question.

728. I am speaking of passengers to every one of the presidencies?—It will depend on where they go from; passengers from Calcutta would not go to Bombay.

729. What passage-money would you propose from Bombay to Suez, and from Calcutta?—I would propose 100 *l.* from Bombay, and 150 *l.* from Calcutta.

730. Mr. *Young.*] You have given us your opinion as to the time that would be occupied between Calcutta and Socotra, and Bombay and Socotra; will you inform the Committee now what time you

calculate it would take to proceed from Socotra to Suez in the Atalanta or the Berenice ?—In the south-west or north-east monsoon ?

731. In the south-west monsoon first ?—You see, going from Socotra to Suez, you have got out of the line; I think you ought to be in. You have got away from Guardafui; you have got too far to the north; nevertheless you might make a course, and get back upon the coast of Africa and that way; I *should allow 808 miles for the run,* at 150 miles a day in the south-west monsoon, from Socotra to *Babelmandeb.*

732. That would be about six days ?—About six days, not quite.

733. *And from thence to Suez ?—From* thence you have 1,200 miles to Suez against the north-west *monsoon, and wind for the whole distance,* a strong north-west wind.

734. At what rate do you calculate you might steam under those circumstances ?—I think you should allow 10 days for that; it is 1,200 miles; you might do it in less, but you could not calculate on doing it in less: it is very near 1,300 nautic miles I think from Babelmandeb to Suez; 1,065 to Camaran, and 165 to Babelmandeb; that is 10 days. I think it might be done in 10 days.

735. And on the return coming down the Red Sea ?—The north wind blows so much in the Red Sea, that you might almost sail down. I should think you would run down on an average at the rate of 240 miles a day.

736. Right down to Babelmandeb ?—Yes.

737. *Chairman.*] In the north-east monsoon it would be the same thing, the wind always blows there ?—Yes, but it does not blow so strong; then I should allow them 200 miles a day in the north east monsoon, one day with another, throughout the whole voyage.

738. That would make how much ?—Twenty-six days without delays, without detentions; but part of the present plan is to send sailing-vessels when steam-vessels are unavailable.

739. Perhaps you can give us an estimate of the number of passengers from Bombay and from the eastern side of India ?—It is very difficult, because when the Atalanta has gone at long intervals, she has carried more passengers than if she had gone probably once a month; she never carried more than 20, and she has left passengers behind who wanted to go with her.

740. Mr. *Young.*] But do not you consider that the number of passengers who would be likely to pass between those respective points, would be greatly increased with any increase of facility for their passage ? —Yes, I think it would; I think people would go if they had no reason for going, when they had a good opportunity of travelling provided. I think the conveyance makes passengers.

741. *Chairman.*] Then you can form no estimate of the number of passengers that would go from the eastern side of India ?—No; I should think there could not possibly be 240 people by Bombay in the course of the year.

742. Mr. *Bagshaw.*] Do you happen to know the number of passengers that have been going to and from in the course of any given year all the presidencies of India ?—No, that I do not.

743. Do you happen to know it has been stated that while Bombay only takes to and from 603 passengers, Calcutta, Madras and Ceylon take 2,566 ?—I should think that is very probable; Calcutta then would supply her steam-vessels with passengers.

744. Do you thing it would be unfair to suppose 1,000 passengers would go from India to and fro in the course of a year, if proper steam communication were established to all the presidencies of India ?—There are a great many people who do not like steam-vessels; but I think you may assume that. For all India, I think there might be 1,000; I do not know whether there would be so many by steam; I think there would be more than 500.

745. I dare say you are aware that however objections may be raised to steam-vessels in this country, that in India there is quite a contrary feeling with regard to them ?—Yes; and I have no doubt that that contrary feeling would become universal if it were established. There is nobody that could afford to go by a steamar that would not prefer that to a sailing-vessel, if proper accommodation were provided. On that account I should say 1,000 might be assumed.

746. Each way ?—Each way: not at the beginning, but after a time.

747. Mr. *Young.*] Supposing the number were equal to that which you state, namely, 1,000, what proportion of them do you imagine would proceed to and from Bombay, and what proportion to and from the other presidencies of Madras and Calcutta, supposing there was equal facility for passing between the whole ?—I should think not above one-sixth would go by Bombay; it would be much safer to assume 500, because that is as much as you would be able to take if you wish to establish them once a month.

748. *Chairman.*] You mean there would not be room for more ?—No; not of ladies and gentlemen exclusive of their servants.

749. Well now, have you any knowledge of the Post-office receipts ?—No; in fact, nobody can have any knowledge.

750. Because letters that go round the Cape hitherto cost nothing ?—Or next to nothing; but that is no criterion to go by; there will be a heavy charge by steam.

751. Have you any opinion as to what should be the rate of postage ?—I believe they have fixed half-a-crown for a single letter, and I think that is very fair from England to Bombay.

752. And do you know what it is to Calcutta ?—No; but I believe about as much more? about as much more I think; I remember having letters that came to half-a-guinea; double letters from Calcutta, and I think it was one-half for the packet, and one-half for the dock.

753. Is this a new arrangement of the Post-office ?—Yes.

754. Mr. *Bagshaw.*] Now is it proposed in the present establishment that Mr. Waghorn shall be able to charge for the transmission of letters ?—No, to charge nothing.

755. Then they will charge this way for a single letter 3 *s.* 6 *d.* ?—No; half-a-crown from London to Bombay; that is the arrangement with the Post-office, but though they charge 3 *s.* 6 *d.* for a Mediterranean letter, they only charge half-a-crown for an Indian letter; and the Post-office are to receive the whole of the postage, the Company are to receive none; and after the return from the postage is deducted, the whole net remaining charge is to be divided between the King's Government and the Company.

The Company under that arrangement will get nothing but the inland postage from Bombay, and therefore though that may be an indemnity to the Company for recovering one-half of the charge of sending letters from Bombay, for letters sent from Bombay, Madras and Calcutta it will be necessary to make a *new bargain, or they will get nothing at all.*

756. Mr. Young.] Then if the arrangement at present made were altered, and a plan substituted for communicating from Suez with Mardras and Calcutta direct, the Company would lose all the indemnity that they at present calculate upon to be received by them for the conveyance of letters from Bombay to the other presidencies ?—Exactly.

757. That may, *in your opinion, perhaps, constitute a* good reason why the Company should not be favourable to it without making a new bargain with the King's Government, because doubling the distance must double the charge, and deprive them of all possibility of any return.

758. *Chairman.*] Do not you think also, that the high rate of postage from Bombay to Calcutta would interfere very much with the sending of the number of letters that would go by that conveyance ?—Yes. I rather think the Bombay postage is higher then the present Mediterranean packet, or very nearly equal.

759. Might not letters be conveyed direct to Calcutta by steam at a cheaper rate than they would be conveyed to Bombay, from thence by Daulk and Calcutta ?—No, I think not. I think the expence by steam would be greater, certainly. I understand the question to be whether the steaming expense would not be as little as the Daulk expense, sending them first to Bombay and then to Point de Galle, which I understand is the plan, to Bombay, Madras and Calcutta. I conceive the expense by steam would be very much greater than that of the Daulk.

760. You mean the expense of two additional steam-vessels ?—Yes.

761. And that therefore the postage should be increased in consequence ?—You would want more than two additional steamers, because you would not take them to Bombay at all. You would want more than two.

762. Supposing that there was any room for freight in the Red Sea, do you think there would be any that you might have a profit from, freight from cargo, that is ?—I should think very little ; there could not be much room for freight, there would be room for treasure. The treasure is usually considered the perquisite of the captains ; it was given to the captains of the King's vessels and to the captains of the Atalanta and the Berenice. Things of great value in a small compass would pay freight, but it would not do to calculate on much profit from it. No doubt there might be some, but I do not calculate on a profit to the Company from anything they will undertake in that line ; there might be some returns, but not great.

763. Supposing it were a company, I do not mean the East India Company, but a private steam-company, how would it be then ?—I think they would be losers by it at the very best they could make of it.

764. But you think they will gain a great deal more than the East India Company, because what can they desire more if they fill their vessels with passengers and cargo ?—But there is so very little space for cargo. The Scotch steamers that run two days between the Scotch port and London carry a great deal of cargo, and they find it a very profitable return ; but these vessels which run a long distance, and which have to be taken up almost entirely with fuel, can carry nothing but fuel and treasure, small articles.

765. Mr. *Young.*] Have you ever calculated what space the Atalanta or the Berenice might have disposable to cargo, after taking in the coal they would require for the longest part of the passage ?—I think that might be very easily calculated in this way : if you allow them 20 tons a day, which is more than they will consume, especially the Atalanta, for she does not consume more than 13 ; but if you take 20 tons a day and 200 miles a day, and divide the coals upon that basis, then, according to the run, you may or not have a space disposable to cargo. If she were running 10 days, and you take for that at 20 tons a day, 203 tons, you would have 50 left in the Atalanta.

766. Mr. *Bagshaw.*] There will be space for cargo, but not in the south-west monsoon ?—Yes ; a cargo from India in the south-west monsoon should be entirely left out of the question ; they should carry as much coal as they possibly can ; they should hardly carry gold, certainly no silver.

767. *Chairman.*] Have you at all considered the political consequences of bringing England and India so much closer together ?—Yes, I have ; I do not see that there could be any possible harm from bringing them closer together. I do not know any great good. I do not see what it can consist in, if we get a regular communication and know what is going on, so long as we are at peace. I do not see whether knowing in February what we should otherwise know in April, would do much good to this country or the Indian government. In time of war expeditious communication is advisable ; but in time of peace regularity is the thing, and perfect knowledge when we get it ; if we have a regular communication and imperfect knowledge, occasional expedition will not make up for it.

768. Mr. *Young.*] Is not a rapidity of communication very important in a commercial point of view ? —I have heard commercial men doubt that ; they do not want the bills and invoices without the goods ; they do not want the bills to anticipate the goods.

769. Mr. *Bagshaw.*] Do not you think the commercial community think as you think politically on the subject, that regularity of information is what is so much required by them ?—I have no doubt that is their opinion.

770. Mr. *Young.*] More than dispatch ?—More than dispatch.

771. Mr. *Bagshaw.*] Will not a regularity in overland dispatch be of great advantage to the commercial community ?—No doubt of it. The Court of Directors said something about that ; respecting the general effect of carrying on these insulated experiments, that they did more harm than good : did mischief ; created disappointment.

772. Mr. *Young.*] But do you not think that the intercourse, both personal and commercial, is likely to be extended into the two countries in proportion as you diminish the difficulties of communication ? —Certainly.

773. And must it not be a general benefit to India that the intercourse between the mother country and those distant possessions should be facilitated ?—I am not sure that it would be any benefit to the people of India to send Europeans amongst them.

774. That would apply to an extension of European intercourse in India?—Yes, the general question was whether the access of Europeans to India would not be an advantage to India; I do not think it would.

775. *Chairman.*] But do not you think that a consequence of this regular and speedy and convenient communication will be the resort of a great number of Europeans to India?—Yes, I do certainly; and I think the motive of passing though countries that are interesting from their antiquities, would be a motive for people to go in that line.

776. But you think a greater number of Europeans will go to India in consequence?—Yes, I think so.

777. Do you think that will have a good or a bad effect?—In what way? On the morals and domestic happiness of the people of India? I should say, a bad one.

778. May I ask why?—Why, I think whenever thay have come into contact with Europeans not under the control of the East India Company, they have been oppressed and ill-treated.

779. You have reference, I suppose, to indigo planters?—Not without exception; but that is my general impression.

780. And settlers?—Yes.

781. Mr. *Young.*] Must not that have arisen from the want of paternal superintendence on the part of the government of India over the interests of the population of the country?—No, it has arisen from the government not having sufficient civil power, judicial power, to control the European settlers.

782. Would not the obvious remedy for such an evil be a little extension of the civil power to that government?—Certainly; but that is objected to as soon as it is done.

783. Then your notion is founded on the supposition that the Parliament of Great Britain would not give to the government of India such power as was requisite to protect the population of India from the oppression of the Europeans?—The Parliament of England has given the government of India unlimited power in the way of making laws, which laws are totally rescinded by the highest authorities. The government of India have made a law, having for its express object the protection of the natives of India against European settlers. That law is subject to very great objection among the European community of the presidencies.

784. But if the government of India persists in considering that it is a paramount duty to protect the population of India from the oppressions of the Europeans, do you not think it possesses the power of doing so?—Yes I do, but I am more afraid of deference to popular clamour than I am of anything under heaven.

785. Mr. *Bagshaw.*] There is one question about the civil power that you say the East India Company wield at present against the European settlers there; is not that civil law administered in a language totally unknown to the European population generally?—It need not be; I think it has been, but I take for granted that a part of the new law will be to administer it in an intelligible language.

786. What is that law, Mahomedan or Hindoo?—The law of the Company is what is called the law of equity and good conscience; but they administer the law to Mahomedans according to the Mahomedan law; to the Hindoos, according to the Hindoo law; and of course, to Europeans according to English law but it will be the Company's judges' construction of the English law; it will not be an English lawyer's construction of the law, but it will be the India Company's judges' construction, according to equity and good conscience, of what way the law is applicable to Europeans in India.

787. But are these judges bred up to the English law; do they understand from education the English law?—No; they know nothing of the law.

788.—*Chairman.*] I presume there would be a code?—It is intended to make I code, and one principle of the legislative council was to make a civil code: but they have not advanced one step in their labours.

789.—Mr. *Bagshaw.*] Are not some of the judges in the interior of India both Mahomedans and Hindoos?—Yes; sudderauhmens and moonsiffs.

790.—Do these men generally understand the English language?—Many of them do.

791.—But none of them understand the English law?—No, of course not, not the Company's judges either.

792. Mr. *Young.*] Coming back to the question of steam communication, do you recollect the average time occupied in passing from Falmouth to Suez?—That passage is rather long; they stop sixty hours at Gibralter, they stop some time at Malta; and they are all vessels of small power in proportion to their tonnages; not such vessels as I would recommend for the Indian seas; and they take about 14 days to Malta, and about five or six to Alexandria.

793. And from Alexandria to Suez?—That is about three days:

794.—Making 23 days?—Yes.

795. Mr. *Bagshaw.*] I am told that there is not one of the 96 sudderauahmens in the presidency of Bengal who understand English?—I should think that cannot be correct.

796. But you know very well that the major part of them do not understand English?—I dare say they do not, but the natives of India understand more English than they are given credit for.

797. Mr. *Young.*] Then we have it as the result of the evidence you have to-day given, that during the south-west monsoon 16 days might be calculated as the time of passing from Calcutta to Bombay by dâk?—The extreme time.

798. Ten days from Bombay to Socotra, making 26 days; 16 from Socotra to Suez making 42; and 23 from Suez to England, making together 65 days; does that agree with your ordinary calculation?—Yes; but you must bear in the mind, if you do not arrive at Alexandria exactly when the packet is starting, you may lose a month there.

799. Have you ever directed your attention to steam communication to India by the Cape of Good Hope?—I certainly have; and I think that for Calcutta by far the best line. If I were laying down a new scheme for steam communication with India, I would take Beirout, the Great Desert and the Persian Gulf for letters for Bombay, and the direct line by St. Helena round the Cape for letters and passengers for Calcutta.

800. *Chairman.*] And you estimate the length of that passage at what?—Eleven thousand five hundred miles.

801. Mr. *Young.*]—And the time to be occupied?—Sixty days, changing the vessels at every station.

802. *Chairman.*] How many vessels?—Twelve.

803. *To India and back to Europe?*—Yes; that is, they would change their stations, and every one of *them return; they would continually change their stations.*

804. *And there would be no returns?—There would be some returns for letters and passengers, whatever that may be.*

805, *Has there been much communication with the Pacha of Egypt respecting the passage through his territories?—No; he has always expressed himself very friendly to it. He has been very desirous to have steam communication established with Egypt.*

806. You think he would do everything in his power to facilitate that intercourse?—I have no doubt he would do everything in his power.

807. Do you imagine he would permit troops to pass in case of necessity?—Yes; I believe he would do anything within his power. I think he would allow English troops to pass; he would have sufficient reliance on English good faith to do it.

808. I suppose for the sake of pleasing the British Government?—Yes, and to bring people, or goods, or anything to his own country.

809. And, in short, to increase the commerce of his own country?—Yes, and the number of persons that resort to his own country. He has the materials for a railroad which are not laid down, for Cairo to Suez.

810. With respect to the improvement of the natives of India, do you think that many natives of India would come to England?—No; I think very few.

811. Why do you think they would not come?—I think nothing would bring them here but a very strong grievance; they have great objections to the sea, all of them. A grievance would bring them, but even that would bring but few of them, I think not else. Here and there a Zemandar, who was counted wealthy, might send a son or two to England; but I think the number would be very small.

812. I do not know whether you recollect an opinion expressed by a medical committee in Calcutta, that if inducements were held out, many natives would be inclined to come to England for the study of medicine, surgery and other sciences?—I do not recollect the opinion. I dare say, like every other people if they thought they could get anything by it, they would come here or anywhere else; it would depend on the chance of profit they might make.

813. If they saw clearly it was to their interest to come to England, they would do so, notwithstanding any prejudice?—Yes, I think interest will overcome prejudice anywhere.

814. Now I do not know whether this has ever struck you as a source of saving to the Company, and therefore of profit to a certain degree; you know that all civil servants going to the Cape of Good Hope receive a considerable portion of their allowance there; that is, they receive, I believe, in the most unfavourable cases three-fourths of their allowance there?—Yes.

815 That is, men having 4,000 *l.* receive 3,000 *l.* while there?—Yes.

816. You know the military officers receive all their allowance there without any deduction?—Yes.

817. You also know it is a two months' voyage to the Cape of Good Hope by sea?—Yes.

818. You also know that the period of furlough may be, and latterly has been, extended to two years?—Yes.

819.—You probably do not know: but the amount of mony so expended must be a very considerable sum in the course of a year?—It is.

820. Now, do not you know that by allowing the civil and military officers to come to England instead by steam, that they would very willingly prefer that route, and if they do that a very considerable saving would be made?—Yes; but that would require a very great change in the regulations.

821. I am supposing that?—Of course they would rather come to England than go to the Cape, but they must be allowed to receive their Indian allowance in England, which under the present law they cannot do.

822. But why should you allow them their Indian allowances, or a portion of their Indian allowance? —I mean a portion of them.

823. Because it would be the same thing as coming on a furlough; that would, you know, allow them to come to England to see their friends, which certainly would be a very considerable advantage, and I should suppose there could be no reason for continuing them their Indian allowances when neither military or civil officer in this country have them?—But many a man would rather go to the Cape and receive his allowance than come to England and lose it.

824. But would you allow him to do that; would it be reasonable to give him that advantage?—I think perfectly reasonable, as far as I see at present; no objection to it strikes me now.

825. It would be a very great expense?—To him.

826. But I mean expense to the Company?—Not, if he do not receive his Indian allowance. I am afraid I am misunderstood; I say if he comes to England and does not receive his Indian allowance, I see no objection to it; but I see great objection to his coming to England, and receiving his Indian allowance; but if you save his Indian allowance, how is it an expense to the Company?

827. I say that would be to the Company a considerable saving?—Yes; I see no objection to that.

828. The object of the Company has been always, as much as possible, to prevent the officers from coming to Europe, has it not?—I do not know that.

829. Do not you think it would be a very great advantage to officers, both civil and military, to allow them the facility of coming to England, instead of the Cape of Good Hope?—Yes; if they choose to come without their Indian allowances, in preference to staying at the Cape with them; I doubt if many of them would do it

830. Mr. *Young.*] The question put by his Lordship was, whether you think it would be reasonable to leave to them the option of going to the Cape of Good Hope, with their Indian allowances, if they had

the means of returning to England, where they would not receive them ?—I do not see any present objection to that; but there may be some reason among the old restrictive regulations of the Company; if they go out of India for the benefit of their health for a certain time, I do not see what consequence it can be where they go.

831. *Chairman.*] I suppose you have heard of the great disadvantage of acting situations in India ?—Yes.

832. Officers are able to go the Cape of Good Hope, or absent themselves, we will say, for nearly three years, and they receive three-fourths of their allowance during that time; somebody is put in to act in succession, and there is an acting succession of strangers, knowing they are only there temporarily, not knowing for how long and not caring about the duties of their situation ?—Yes, that is all true.

833. I consider that one of the greatest curses of the Indian administration ?—So it is.

834. Would you not able to get rid of all that, by permitting them to come to England, not holding their situation ?—Yes, you would, but you would save nothing then, because you would pay the full allowance to someboby else; but you would pay the person who did the duty.

835. Mr. *Young.*] Could you not do that now, by an alteration of the system without steam navigation ?—They would be longer in coming and going back. I understand his Lordship's argument to be, that by steam navigation the Company's officers would come as expeditiously to England as without steam navigation they might go the Cape.

836. Mr. *Bayshaw.*] Just explain to the Committee the present plan of steam communication from Suez to Bombay?—The plan is, that all the vessels which are at present available, namely, the Atalanta, the Berenice and the Hugh Lindsay shall be employed in this manner: the Atalanta and the Berenice alternately to go every month from Bombay to Mocha and back. The Hugh Lindsay to go every month from Mocha to Suez and back. The Atalanta and the Berenice will take some time after their arrival at Bombay to be fitted for the Red Sea. The Hugh Lindsay will take some time to be stationed there, and when she is there, she connot run at the utmost more than one-half the distance which this plan assigns to her. The Atalanta and Berenice are not fit for the harbour of Mocha, because they draw more water than the inner anchorage of Mocha allows; therefore though the orders are gone out to establish steam navigation as expeditiously as possible in this manner, it must be a considerable time before those orders can be executed at all, and still more to the extent of establishing a monthly communication. If, therefore, letters are sent to the English post-office for India in the expectation that a monthly communication will be immediately established, all the persons relying upon that conveyance will be disappointed.

837. Perhaps you can tell the Committee when, in your opinion, the communication to Bombay will be complete ?—It depends upon when we build more steamers; if we set about it immediately, and build English steamers, it will take twelve months before they can get to Bombay; that is the utmost expedition; if we send out engines to Bombay it will take longer, because here the engines and vessels could go on together; there they scarcely could until they got them; I should think that a two-monthly communication might be established now, but a monthly communication, not for two years at any rate, from this time, certainly.

838. *Chairman.*] Are there any orders for other steamers ?—No; there is a promise by the Government to set about building another immediately.

839. Mr. *Bagshaw.*] When did the orders go out to Bombay ?—They are just gone within this week, I think about a week ago; I do not know what conveyance they have gone by; they have gone by Marseilles most likely.

840. And that was consequent upon the report of the steam-Navigation Committee of July 1834 ?—Yes.

841. On an arrangement made by the Court of Directors and his Majesty's Government consequent upon that recommendation ?—The Committee are of course aware that steam-packets are established from Alexandria to Marseilles every day; here is a table of the distances by the Persian Gulf, by the Red Sea, and by the Cape of Good Hope to Bombay and Calcutta, and by all the routes available for steam-navigation to India.

842. You would wish to put those in would you ?—If you please.

[The same were handed in and read.]

843. *Chairman.*] The French packets will give great facility to this communication, will they not ?—Very great; they go every ten days.

844. The distance is about 1,000 miles going by Marseilles ?—And by Gibraltar from London, and of course the time will be materially less.

Distance from *London* to *Bombag*, in nautic miles, by the undermentioned routes:

	Miles.
By the Persian Gulf, *via* Marseilles and Malta, and from Beirout to Mohammara, in direct distance.. ..	4,518
Ditto, *via* Marseilles, Malta Beirout and Damascus, and from Damascus to Mohammara over the Great Desert..	4,698
Ditto, *via* Marseilles and Malta, Beirout, Damascus and Bagdad, and from Bagdad to Mohammara by the river Tigris	4,788
Ditto, *via* Marseilles and Malta, Sonadia and Aleppo, and from Beles to Mohammara by the river Euphrates..	4,823
Ditto, *via* Falmonth and Malta, and from Beiroat to Mobammara, indirect distance..	5,590
Ditto, *via* Falmouth and Malta, Beirout and Damascus, from Damascus to Mohammara over the Great Desert..	5,770
Ditto, *via* Falmouth and Malta, Beirout, Damascus and Bagdad, from Bagdad to Mohammara by the river Tigris..	5,860
Ditto, *via* Falmouth and Malta, Sonadia and Aleppo, and from Beles by Aleppo to Mohammara by the river Euphrates	5,895
By the Red Sea, *via* Marseilles and Malta..	5,238
Ditto, *via* Falmouth and Malta	6,310
By the Cape of Good Hope, *via* Johanna	10,580
Ditto, *via* Mauritius	10,790

Persian Gulf Routes, from *London*, in nautic miles.

(1.)

BY MARSEILLES.

	MILES.	
Brighton..	44	
Dieppe..	70	
Paris..	114	
Marseilles	440	
Malta	630	
		1,298
Beirout..	1,080	
Mohammara, in direct distance,	640	
Bombay..	1,500	
		3,220
		4,518

BY FALMOUTH.

	MILES.	
Falmouth..	230	
Gibraltar..	1,120	
Malta..	1,020	
		2,370
(Difference, 1,072.)		
.. ..		3,220
		5,590

(2.)

BY MARSEILLES.

	MILES.	
Malta, as in No. 1		1,298
Beirout..	1,080	
Damascus	60	
		1,140
		2,438
Mohammara, by Great Desert		760
		3,198
Bombay..		1,500
		4,698

BY FALMOUTH.

	MILES.
.. ..	2,370
.. ..	1,140
	3,510
.. ..	760
	4,270
.. ..	1,500
	5,770

(3.)

BY MARSEILLES.

	MILES.	
Damascus, as in No. 2		2,438
Bagdad	500	
Mohammara, by Tigris	350	
		850
		3,288
Bombay		1,500
		4,788

BY FALMOUTH.

	MILES.
.. ..	3,510
.. ..	850
.. ..	4,360
.. ..	1,500
	5,860

(4.)

BY MARSEILLES.

	MILES.	
Malta, as in No.		1,298
Sonadia	1,100	
Aleppo	70	
Beles	55	
Mohammara, by Euphrates..	800	
		2,025
		3,323
Bombay		1,500
		4,823

BY FALMOUTH.

	MILES.
.. ..	2,370
.. ..	2,025
.. .. ..	4,395
.. ..	1,500
.. ..	5,895

Red Sea Routes from *London*, in nautic miles.

(5.)

BY MARSEILLES.

	MILES.	
Brighton	44	
Dieppe	70	
Paris	114	
Marseilles..	440	
Malta	630	
		1,298
Alexandria		830
		2,128
Cairo	100	
Suez	70	
Camaran	1,065	
Babelmandeb	165	
		1,400
		3,528
Bombay		1,710
		5,238

BY FALMOUTH.

	MILES.	
Falmouth	230	
Gibraltar	1,120	
Malta	1,020	
		2,370
.. ..		830
		3,200
.. ..		1,400
.. ..		4,600
.. ..		1,710
		6,310

(6.)

BY MARSEILLES.

	MILES.
Babelmandeb, as in No. 5	3,528
Point de Galle	2,360
Calcutta	1,170

BY FALMOUTH.

	MILES.
.. ..	4,600
.. ..	2,360
.. ..	1,170

(7.)

BY MARSEILLES.	MILES.	BY FALMOUTH. MILES.
Point de Galle, as in No. 6,	5,888	6,960
Madras	540	540
Calcutta	720	720
	7,148	8,220

Cape of Good Hope Routes from *London*, in nautic miles.

(8.)

			MILES.
Falmouth			230
Teneriffe	1,400		
Cape Verd	810		
St. Helena	1,990		
Cape of Good Hope	1,500		
		5,700	
Johanna	2,160		
Bombay	2,490		
		4,650	
			10,350
			10,580

(9.)

Falmouth			230
Cape of Good Hope, as in No. 8	5,700		
Mauritius	2,370		
		8,070	
Bombay		2,490	
			10,560
			10,790

(10.)

Falmouth		230
Mauritius, as in No. 9.	8,070	
Calcutta	3,230	
		11,300
		11,530

(11.)

Calcutta as above.	11,533
Deviation to Madras	90
	11,620

Mr. *A. P. Wall,* called in; and Examined.

845. *Chairman.*) ARE you acquainted with the Bay of Bengal?—I am.

846. You have commanded a steamer for some years?—I have for the last seven or eight years.

847. Is there any difficulty, do you conceive, in a steamer of the power of the Atalanta or the Berenice going from point Palmyras, in the south-west monsoon, at the mouth of the Hooghly?—None.

848. Supposing it did blow very hard, is there not a course in shore that they might take?—Yes; they might take a course round in shore by surveying it; it is not at present buoyed off.

849. You know the fact to be so?—I know that to be so. The native vessels invariably use it in its present state.

850. Then what is your opinion of the practicability of making a passage along the coast down to Madras, and on to Bengal?—I think there is every facility? in the south-west monsoon the wind veering to and from the land, it is never a very heavy sea.

851. Does it blow home then in the south-west monsoon; does it blow quite home to the coast?—No; the wind veers from the shore at night and to the shore in the day time.

852. It there any strong swell there?—Not a very heavy sea close in to the land, it is considered a weather shore and little sea.

Major *Charles Head,* called in; and Examined.

853. Mr. *Bagshaw.*] YOU are prepered to make a statement to the Committee, regarding a plan of steam navigation to India by way of the Red Sea?—Yes.

854. Have you that plan with you;—I have it not with me at present; it is prepared, but I have it not with me.

855. Will you deliver it in to the Committee?—I will; I have not brought it with me, not supposing it would be called for to-day, but I will forward it immediately to the Committee.

[Adjourned till Wednesday next at 12 o'Clock.

Mercurii, 28th die Junii, 1837.

MEMBERS PRESENT.

Mr. Bagshaw.	Mr. Gordon.
Lord William Bentinck.	Sir J. C. Hobhouse.
Mr. Crawford.	*Mr. Mullins.*

LORD WILLIAM BENTINCK, in the Chair.

Alexander Galloway, Esq. called in; and Examined.

856. *Chairman.*] You are a civil engineer, residing at West-street, Smithfield ?—I am also a manufacturing engineer.

857. Are you acquainted with Egypt ?—I have been there, and two of my sons are there at present.

858. How long have you been in Egypt ?—I was there about six months; my eldest son has been there 12 years.

859. Are your two sons that are there civil engineers ?—They are.

860. Are you going to Egypt by desire of the Pacha ?—Yes; I am written for by the Pacha; he wishes to consult me upon the propriety of forming a railroad between Alexandria and a place called Adfa.

861. Will you explain what that railway is; its length, and its objects ?—The railway I apprehend can be formed in about 50 miles in a right line, as near the banks of the canal as may be deemed expedient; there is a canal running from Alexandria to Adfa, which canal saves all the necessity of coming into the Mediterranean from the Rosetta branch of the Nile, and saves a distance, probably, I should say, of about 60 or 80 miles; that is, it is nearer to take the canal, by 80 miles, than it would be to go down the Rosetta branch of the Nile, and then get into the Mediterranean. This is the plan of the railway from Cairo to Suez as submitted by witness, *(producing the same).* It is so designed as to always insure the means of communication from a vessel at any period. I believe there is a current in the Red Sea. Those are what are called the camel tracks, *(pointing out the same upon the plan)*; this is the centre road; and this is what is called the upper, and this the lower, or least frequented road, not surveyed; this has been surveyed, and this is deemed to be the best line for making the railway; now the Pacha has suspended this railway merely because he does not feel that the British Government has given him any countenance in the measure. When my son, a bey of Egypt, arrived here, in November 1834, he applied to our Government, and stated what the Pacha was anxious for them to do; simply to express a disposition to pay a mileage, such as they themselves should fix; he thought 6*d.* a ton per mile for the 80 miles would be a sufficient compensation for goods; and as to passengers, he made no stipulation about them. Now, at that period I believe the East India Company were very anxious to make a communication up the Euphrates; that I believe is now tolerably well proved cannot be a practicable project, and therefore I am of opinion that if this Committee could express any opinion, or give him any encouragement, he would proceed with the undertaking, for he has already about 200,000*l.* of the material, with engines and apparatus, for this road. It goes in a right line across the Desert 80 miles.

862. Mr. *Mullins.*] Have not the rails already sent out been applied to the construction of other roads ?—No. There is now in the Mokottam Hills an immense quantity of stone; and for supplying Cairo and the neighbourhood with stone there is a railway from those hills to Cairo.

863. They are a different sort of rails from those provided for the Isthmus of Suez ?—They are; the rail, upon the Cairo road weigh about 60 lbs. to the yard, whereas the rails for the railway from the Mokottam Hills are not above 36 lbs. to the yard.

864. Do you know whether any inquiries have been made regarding water along the line ?—There have been inquiries, but the extent and detail of those inquiries I am not cognizant of but the plan is to carry tenders of water from the Nile, and from the Suez ? we have made carriages for the conveying of water, and we have made eight engines upon the road for pumping the water up to tanks for the feeding locomotive engines.

865. What is the distance of this proposed line ?—Eighty miles in a right line, and four miles to the north of Cairo, making it 84 miles.

866. *Chairman.*] Have rails for the whole way been sent out ?—About a third.

867. Is there any difficulty in making this railway ?—No practical difficulty whatever.

868. Is it good ground throughout ?—Capital ground.

869. Will there be any cutting in any part of it ?—There will; somewhere about four millions of cubic yards to cut, and there will be nearly as much hollow space to fill up in its immediate neighbourhood, and therefore the cutting will be an advantage.

870. Is there no tunnel ?—There is one point at which you might tunnel, but I should say, in a country like Egypt that tunnelling would be a very unpleasant thing; there is no part of this country where we have anything like a distance of 80 miles that would cause so little labour as the line selected in that country.

871. Probably the Pacha has the labour pretty cheap ?—About 6*d.* a day for a strong man: and it will cost for engines and for iron-work from this country about 600,000*l.* for the double line; that is about 7,500*l.* per mile; that does not include the labour necessary for cutting the road.

872. Is there much traffic between Suez and Cairo ?—A great deal; an immense traffic might be created, with proper facilities for conveyance.

873. In what articles ?—Mostly coffee; the Mocha coffee is greatly preferred in all Egypt; a great deal of drugs, and also there is corn and various kinds of produce brought from there, and the trade would be considerably more if the facilities for communication could be increased. I believe the quickest

time any journey ever was performed from Cairo to Suez has been three days; now we should accomplish it in four hours by the railway. I have no hesitation in saying that if railways were laid down judiciously in Egypt, and steamers from Adfa to Cairo established, we should be enabled to perform the distance from Alexandria to Suez in 24 or 30 hours, instead of which it now generally averages from 8 to 10 days.

874. You mean the railroad to Adfa, and then from Cairo to Suez?—Yes.

875. Mr. *Mullins.*] What is the distance from Cairo to Adfa by the river?—It is difficult to say; the Nile is very circuitous; I think myself it is from 140 to 150 miles by water; it will depend a great deal upon the state of the river, for in the high Nile, it is a much shorter distance, but in the low Nile, they are obliged to take the line of the Nile, which is very circuitous. In one of the quickest boats I was three nights and three days in going from Adfa to Cairo. The Nile is sometimes running into the Mediterranean at the velocity of two to four-and a-half miles an hour.

876. Was it in low Nile when you went?—No, the Nile was in good navigable order. We went across the country by one of the shortest courses you could take, but you can get very well from Cairo to Adfa, probably in 36 hours, with the wind and the current. The current is running four miles an hour, and sometimes four miles and a half.

877. Has the Pacha any steam-boats on the Nile?—He had one only.

878. Do you know whether he contemplates increasing them?—Yes; the fact is, he would do everything that would give facility, if he had anything like encouragement to do so, he does not want any pecuniary aid from this country; all he wants us to say is that we think it would be a means of contributing to the prosperity of Egypt, and the prosperity of England.

879. Has he any steamer in the Red Sea?—None at this time.

880. Do you know whether he contemplates having any there?—When I was there he did contemplate having two, for the sake of bringing his own produce.

881. Is it your opinion that he would consent to the passage of troops through Egypt if the British Government asked it?—I have no data to give an opinion upon, but if he could understand the object was not to interfere in the independence of Egypt I should think he would not have the least objection; I know he has the strongest predilection on behalf of England. He is a very enlightened man, and a man of vast liberality.

882. Mr. *Gordon.*] When you speak of the enlightened character of the present sovereign of Egypt, is it not the case that everything depends upon him?—I believe it does. Ibrahim, his son, is a man equally enlightened and liberal, as far as policy extends; a much better educated man than his father, but I do not think he has anything of the splendid genius of the father; the father is a most extraordinary man.

883. But all our communications through Egypt to India must in a great degree depend upon the character of the sovereign who rules the country?—No doubt about it. Ibrahim is a man that has supported every liberal measure that can be suggested; and also there is a grandson that is a very able young man, that would succeed Ibrahim.

884. *Chairman.*] Do you mean Ibrahim's son?—No, not Ibrahim's son; his grandson is a brother's son.

885. Mr. *Mullins.*]—Is it your opinion that the Nile in its low state would be fit for such flat-bottomed steamers as ply on the Indian rivers?—There is no doubt about it; in the lowest Nile, any vessel drawing two feet six inches or three feet can pass, and it is a very short period that the Nile is so low. It would be fully as navigable as the Thames to Richmond at the lowest state.

886. Do you know whether the plague would cause any interruption in the regularity of the intercourse?—It is only in the last six or seven years that they have had any sanitary law at all; but now any vessels coming from any infected place perform regularly quarantine in a distinct harbour; I suppose the ancient harbour of Alexandria. The last plague was occasioned entirely by the unwise and injudicious conduct of the persons who jumped overboard and swam to the convent. It commenced there.

887. As a periodical disease, you do not think it need affect the regularity of the intercourse?—Not at all, I think. My sons have been there during the last two plagues; they were in Egypt, and they never found great inconvenience from it, with proper care. I do not think in both the plagues there were more than 30 or 40 Europeans that died, and any death that takes place during that period is all set down to the plague.

888. Is that because Europeans take greater precautions?—The fact is, that the habits of Europeans are more cleanly, and Alexandria is a very injudiciously situated town; it is low, and there is no pains taken whatever to drain it or to cleanse it in the old town. In the part they are now building there is every attention paid. Ibrahim Pacha has built a considerable number of buildings there.

889. Is the trade great between Alexandria and Europe?—I should say that perhaps seven-eighths of all the cotton is exported from Egypt to different European states; about one-eighth is used in Egypt in its own manufactories. There are generally 200 sail of European vessels in the port of Alexandria.

890. Do you know what steamers the Pacha has there?—He has got two or three.

891. Are they large?—Yes, the Nile is a very large one; it has two 200-horse engines.

892. Do you think that the Pacha would be willing to establish a reasonable rate of customs duties upon goods coming by the Red Sea?—I believe he never comtemplates asking more than 6 *d*, and I believe he would be satisfied with 3 *d.* per ton per mile; now taking it at 80 miles, at 6 *d.* it would be 40 *s.* a ton, and at 3 *d.*, 20 *s.* for the whole distance. Now, I am quite sure that he would be well requited at 3 *d.* per ton per mile.

893. Mr. *Mullins.*] You allude to the railroad particularly; may he not make other charges in the shape of port dues, and for traversing the Nile?—I do not think so. If he was to employ vessels to convey the goods along the Nile, of course he must be paid for such conveyance; but if the parties forwarding the goods had their own vessels on the Nile, I do not apprehend there would be any charge; he is a man of great liberality of mind; there is nothing grovelling or little in him. The revenue of the

country is about seven millions sterling, and I do not believe he spends 10,000 *l.* a year upon his own person.

894. *Chairman.*] When he has occasion to send troops from Alexandria to Suez; how does he send them ?—All upon foot, along one or other of the roads ; there are three roads.

895. Is there any water for a body of men ?—They generally carry water by the camels. There is one well, but I do not think it is in the line of either of these roads upon the Desert. I see no difficulty in getting water.

896. Then are you of opinion that in all respects, whether as regards, the duties or facility of passage, we shall meet with every support from the Pacha of Egypt ?—I am quite sure that you will meet with as much support in every project to promote our welfare as if it was in our own country.

897. Did you make the machinery for the vessel called the Nile ?—No ; I was in Egypt at the time it was done.

898. Was it made there ?—No, it was made by Bolton and Watt.

899. Is not there a great foundry in Egypt ?—Yes ; one erected by my son, at Bolack, one of the first iron foundries in the world.

900. Are there many engineers in Egypt ?—There are always a good many. There are altogether workers in iron in Egypt, perhaps to the extent of 5,000 workmen. They manufacture all their muskets now extremely well.

901. Have they educated any natives as engineers ?—Yes, a good many ; there are not above, perhaps, 40 or 50 English, and the rest are all natives.

902. If any of our steamers came into Suez out of repair, could they be repaired ?—Yes, very easily.

903. Are there ample means of repair ?—Yes ; they could not perhaps do it with as much despatch as we could do it, but still they could perform effectually.

904. Mr. *Mullins.*] Do you apprehend that workman could be found sufficiently expert to effect any repairs that might be necessary ?—Yes, plenty.

905. *Chairman.*] Where is the foundry you have spoken of ?—It is about a mile and three quarters from Cairo , it is upon the banks of the Nile.

906. Then the engineers and workmen could be easily transported to Suez for repairs, if wanted ?—Yes, if they had a railroad from Cairo to Suez they would be there in four hours. There will be water-tanks every 10 miles, and a stationary engine for pumping it up into tanks provided to supply the boilers of the locomotive engines. The tenders discharge the water into a lower level, and then it is raised up to an elevation for the purpose of feeding the boilers of locomotive engines, the same as in England.

907. Is there plenty of water at Suez ?—Plenty.

908. Would the water come from the Nile or from Suez ?—One half would be supplied from Suez, and the other half from Cairo, which is the best mode of supply to save time and expense.

909. Mr. *Mullins.*] Are you aware that a well has been discovered half way between Cairo and Suez ?—No ; yet I have not the least doubt, if there were any trouble or any science employed there, it would be discovered in other places.

910. Have either of your sons given an opinion upon that point ?—No, they have not, to my knowledge.

911. *Chairman.*] Do you know whether there has been any boring ?—Yes, and they have found water.

912. At what depth ?—I think about 200 or 300 feet.

913. Was the water good or brackish ?—Very good water, I believe.

914. Mr. *Mullins.*] Under whose direction were those borings made ?—They were made by persons from England, but I believe it was in the line to what they call the Kordifan Mountains, where there is an immense quantity of iron and coal ; but they soon found that the conveyance of iron and coal from Kordifan would be more costly than from England. But they have discovered very superior coal and very superior iron in Syria, within about 18 miles of the sea, and they have last year sent 1,200 tons of that coal to Alexandria from Syria. We have sent out some very experienced coal and iron miners there.

915. Can you form any opinion as to whether the coal so discovered would be available for steam purposes ?—No doubt about it ; there is very little coal that will not answer, though, when you come to generate steam, one coal will be more economical than another. I have not seen the coal myself ; I have received information that it is most excellent coal, and it is among some of the first levels ; now, we know that coal always gets better as you get deeper.

916. Do you know whether any specimen of that coal has been sent to this country ?—I do not think there has, because, if there had, I should have been sure to have seen it.

917. *Chairman.*] What distance are the coal pits ?—I believe the distance from Alexandria to the port in Syria is somewhere about 350 miles. It is what they generally perform in from three to five days in sailing vessels. I have no doubt that the Pacha will be quite competent in a very short period to supply all the steamers at Suez. Hitherto it has cost 5 *l.* a ton for the steamers at Suez ; now, we could send coals from England, and deliver them at Suez at 2 *l.* 15 *s.* a ton, paying the freight from England. The best evidence that Syria coal would answer for the purpose of generating steam is, that the Nile steamer has been supplied with that coal, and I believe they have made coke from it for the foundry ; but the part where the coal pits are situated is 18 miles distant from the sea, on the coast of Syria, and they have no roads, and no means of conveying it but upon the backs of animals, and it is a question of economy. If we can send coals from here to Alexandria, and deliver them at 40 *s.* a ton, the Pacha says, "What do they cost me in coming from Syria ?" and if they cost a shilling more from Syria, he will have them from England. We have sent, in the last two years, upwards of 10,000 tons of coals for him to Alexandria.

Captain *Andrew Henderson*, called in ; and Examined.

918. *Chairman.*] ARE you acquainted with the Idian seas ?—I am, for 20 years.

919. Have you commanded both steam vessels and sailing vessels ?—I have.

920. Is there any difficulty in going in a steam vessel from the mouth of the Hooghly to Point Palmiras?—None whatever.

921. Do you state that upon any experience of your own?—Yes; I have often gone there, both in steam vessels and in sailing vessels, and there is no difficulty in either the one or the other.

922. In making the passage from Point Palmiras to Madras, and then from thence to Point de Galle, during the south-west monsoon, would there be any difficulty for a steamer?—There would be none, except from a foul wind; certainly none which a steamer could not contend against.

923. Along the whole of that coast are there not land and sea breezes?—It varies, but generally speaking, the wind is off the land in the south-west monsoon.

924. At what rate do you think one of the large Scotch steamers would make that passage against the monsoon?—I should think they ought to average five or six knots against the monsoon.

925. Are you acquainted with the sea round Dondra-head?—I have been there two or three times.

926. Do you think a steamer could make a direct passage from Point de Galle through the Golandos Channel to Socotra?—I think it is practicable, but she would, of course, meet with difficulties during the south-west monsoon.

927. Do the difficulties arise from the wind or the current?—Both.

928. Did you ever make that passage during the south-west monsoon?—Never; it is never attempted by sailing ships, because they are mostly deeply laden ships, but I think it would be practicable for a steamer or for a fast-sailing trader.

929. Have you never been there at that season?—Yes, I have come round this way; I have never gone round against a monsoon there, because it is seldom attempted by sailing vessels, but that has lately been done by several of the clippers.

930. Will you explain what a clipper is?—A ship built for fast sailing.

931. And the passage has been made round Dondra-head to Bombay several times?—Yes.

932. You made a voyage from Calcutta to Canton in the Forbes steamer, towing another vessel?—Yes.

933. What was the power and tonnage of the Forbes?—One hundred and seventy horse power, 302 tons.

934. What was the tonnage of the vessel tugged?—Three hundred and eighty-five.

935. At what season of the monsoon was it?—It was against the north-east monsoon.

939. You performed the voyage to China?—I did.

937. Was the monsoon strong?—It was a strong monsoon.

938. Was it more or less strong than the south-west monsoon in the Bay of Bengal?—It was less strong in the first part of it; in the last part we got out of fuel, and were obliged to make sail, and we got a strong gale.

939. How many knots an hour did you make while you tugged this vessel against the monsoon?—According to the state of the wind, from three to six.

980. There is nothing in the monsoon in the Indian seas that would prevent the passage of a powerful steamer at all times?—Certainly not, barring the chance of their falling in with a hurricane, which they must take in all seas.

941. And in the event of falling in with a hurricane they would ride it out as well as any other vessel?—Just so.

942. Have you been at Socotra?—I have never been in that part.

943. The wind is said to blow hard, and that there is a considerable sea round the island of Socotra?—So I understand it, and that the wind blows stronger there than further down.

944. Do you think there would be any difficulty in a powerful steamer making that port?—She would have to contend with more sea than there generally is, but no practical difficulties certainly.

945. Mr. *Mullins.*] You are acquainted with the Forbes steamer; can you state what quantity of coals that vessel carried?—I think, with the very best coals, she carried 11 days.

946. In how many days was the passage effected?—We had a supply on board the ship also; we had only one good supply at starting; we were obliged to take fire-wood at Singapore; and in China no arrangements were made, and we were obliged to take whatever we could get, new wood, and all kinds of things; but if we had good coals, as we had at first, she would carry 11 days, and she did it.

947. *Chairman.*] You must have passed very often through the Straits of Malacca?—I fancy about 40 times.

948. You must have heard a good deal of the piracy going on in those seas?—Yes.

949. Do you think that could be put down by a steamer?—Very easily.

950. Is it not impossible to do it by sailing vessels?—It is impossible to do it by sailing vessels, if we go determinedly to work as Captain Chance did.

951. Mr. *Mullins.*] Do you think the Forbes was a proper vessel to make the passage from Calcutta to China?—Not at all; she was built as a tug-vessel in the Hooghly; and in the case of her being sent to China, it was an opportunity that occurred at a week's notice.

952. *Chairman.*] From your experience, what tonnage and horse power should you think would be best adapted for a steamer to perform such a passage?—I should think the larger the better for a long sea voyage.

953. Can you name any vessel that you think well adapted for the purpose?—Such a vessel as the Monarch.

954. What is her tonnage and horse power?—Two 90's. There is another very fine boat to Hamburgh, a vessel of great capacity, which is the thing principally wanted, for carrying coal; the larger the better, because the more space you have for carrying fuel; and as you increase the size of the vessel she will be better able to contend with the sea, and be propelled by a less consumption of fuel in proportion to the size.

955. Mr. *Mullins.*] Is it your opinion that in a vessel of a larger class there would be less danger of straining the machinery in hard weather than in a smaller one?—I certainly think so.

956. *Chairman.*] According to your own experience, what sized vessel would you recommend for the communication between India and Suez?—I think for a long voyage a vessel not less than 1,000 tons, with a horse power in proportion.

Thomas Edward Mitchell Turton, Esq., called in; and Examined.

957. *Chairman.*] YOU were a barrister at Calcutta?—I was.

958. You practised in the Supreme Court?—Yes.

959. How many years?—About 15 years.

960. You were a member of the steam committee at Calcutta?—I was a member of the Bengal Steam Communication Committee.

961. You lately arrived from India by the route of the Red Sea from Egypt?—I came from Calcutta by Bombay. First I went to Bombay, and then from Bombay to Cosseir, across the Desert to Gherich, and down the Nile to Cairo, and from thence to Alexandria.

962. Did you bring your family with you, and of what did it consist?—I did, and it consisted of my wife, myself, and six children, besides our servants. I had one child of nine years, and all the rest under six; one indeed was only just a year old.

963. In what manner did you make the voyage to Egypt from Calcutta?—From Calcutta I went in a ship, my own ship in fact, to Bombay.

964. How long were you making the voyage?—I was two months; I was obliged to go down into eight south, to round Ceylon to make our westing in that latitude, and then to come up again to Malabar Coast. At Bombay I remained a month, or nearly so, and there I hired a small vessel to go to Suez in the north-east monsoon, and I had a very favourable voyage from there to Cosseir, a fair wind almost the whole way, which it invariably is at that season. I was just one calender month.

965. Did you find any difficulty or encounter any danger in your passage through Egypt?—None whatever; I found no more difficulty than that which must attend the removal of a large family, such as I describe, in any part of the world. We travelled with very little inconvenience, and as to danger there is literally none.

966. What are the facilities of travelling across the Desert, and might those facilities be readily and at a small expense increased?—The facilities, such as they are, are considerable. The hire of camels is exceedingly reasonable; the hire of donkeys, upon which you ride, is exceedingly reasonable; also food and provisions are readily obtained, with the exception of water, which you are obliged to carry with you a great part of the way. You travel slowly, but the road is perfectly good and level. There is not a danger of any kind upon the whole road, and the road is generally tolerably hard; in fact, it is not a deep sand, except here and there; and I understand that the road across the Desert from Suez is much better than that from Cosseir to Gherich, in which there is a rise on one side, and a proportionate fall again to descend into Gherich.

967. Might not those facilities be easily increased?—I understand a very trifling expence would convert that road into a perfectly good carriage road, as good as any in England. The materials are upon the spot, and only a slignt proportion of labour is required to convert it into a perfectly good carriage road.

968. Were you in any degree inconvenienced or impeded by the plague, or the apprehension of coming into contact with persons infected by it?—Not in the slightest degree. It was not the season of the plague, though there were occasional cases of plague, and we had foul bills of health from Alexandria. There were occasional cases of plague at Cairo; but both at Cosseir, at Gherich, and the whole way down the Nile to Cairo, we intermixed freely with the natives of the country, without the slightest percaution whatever, and both myself and my children, including even the infant, rode about the bazaars at Cairo to see what there was there, and intermixed with every person we met, and never felt the slightest apprehension, nor, I believe, had any cause for it. I consider the plague, except at certain seasons, a mere bugbear; for at the very season I went, I met Lord and Lady Brudenell, who I think expressed some apprehension of coming into contact with the natives from it. They had come from England fresh with the prejudices of England as to the plague, and felt an apprehension which I did not in the slightest degree. I found that every person in Egypt treated the subject of the plague very lightly indeed.

969 Have you ever considered the subject of steam communication with India by way of the Red Sea?—I have. In consequence of being upon that committee I considered it necessary to consider the subject much more than I should otherwise have done, and what time I had to spare I have devoted a good deal to the consideration of the subject.

970. What are the wishes and desires of the Calcutta community, so far as you, as a member of the steam committee, are aware of them, upon the subject of steam communication with India?—I can say in general, as having been deputed by the committee there to represent them in common with other members of the committee formed in London, that they desire most undoubtedly a comprehensive plan, which would embrace all the presidencies. They certainly do not consider that Bombay would contribute its due proportion to the expenses, but they think that that, as well as every other part of India, ought to be included in the communication, and it ought not to be merely a question of what they would pay in one portion of India, and what they would pay in another, but that every part of India ought to have the benefit of a speedy communication with Great Britain. They are exceedingly desirous of avoiding the expense, delay and risk from robbery at all seasons, and from swollen rivers, during the period of the rains, which are very considerable between Bombay and Calcutta; they consider that they would save time and expense very considerably by the route of the steam vessel being direct to Calcutta, and they consider that it is rather hard that they should be taxed alone for the benefit of that communication, whereas Bombay would pay nothing whatever. If the steam communication were only to go through Bombay there would be no sort of convenience either to them or the inhabitants of Madras, or the inhabitants of Ceylon, if the communication was confined to that; and we certainly do consider that a steamer from Socotra would reach Galle as soon as a steamer would reach Bombay, and that the steamer would go on to Calcutta in six or eight days, according to the time of the year and the weather she might meet with, and thereby save time as well as greatly increase the convenience of communication. They

also feel satisfied, that to make it answer all the presidencies must be taken in, and that it will answer if they are all taken in, but that it will not answer, under any circumstances, if only Bombay is taken in. That is the general outline of their views upon the subject. We consider that the return which we shall give from the three presidencies of Calcutta, Madras, and Ceylon, would not be less than 133,600 *l.* towards the expences of the plan. Supposing the route to be complete, not only from Calcutta and Bombay to Suez, but from Alexandria home, which we consider would contribute very much to the profit of the whole scheme, as well as to the advantage, our calculation is this: one half of the present number of passengers, that is 1,280, at 95 *l.* each, our profit, would yield 121,600 *l.*, and the letters being 120,000, which is also a moiety of the whole letters that go to India, at a rupee each, would return 12,000 *l.*, and that would make 133,600 *l.*, exclusive of all freight, specie, parcels, and periodicals. Now, Bombay yielding a like proportion, at the same rate, will only give 302 passengers, paying 28,690 *l.*, and 26,000 letters, paying 2,600 *l.*, that would make 31,290 *l.* only; whereas the expence must be precisely the same to Bombay, whether it goes to Calcutta or not, up to the point of Socotra. We also consider that there would be a considerable freight if it went the whole way, and particularly for specie, between Madras and Ceylon, and Calcutta and Bombay, also of plate; there would be none, literally none, if it was to be confined to Bombay. I do not suppose they would carry an ounce of treasure, with the exception of articles of plate for the consumption of the Bombay market, in the twelve month between Bombay and Alexandria. We also consider that if steamers of adequate power and tonnage were placed upon the whole line, there can be no doubt, that one half the passengers and one half the letters, at the rate at which I say, would go by that route in a very short time; I will not say that it will be the first year, but I consider that it would within a very short time be at least to that extent. I am borne out in that opinion by other gentlemen from Calcutta and Ceylon; they all think with me upon that. They think that a communication to Bombay alone would be useless for any purpose but that of postage to India; I mean if confined to Bombay, and I beg I may not in the least degree be understood as in the slightest degree advocating any communication which excludes Bombay from participating every advantage which is to be derived from it. I have made my calculations upon the vessels similar to the Medea, which I saw in the Mediterranean, and over the whole of which I went, a vessel of 800 tons and 220 horse power. I consider that she is as perfect a vessel as it is possible to have; in economy of fuel, in her rate, in her capacity, in all those circumstances, she is the finest vessel, without any exception, that I have ever yet seen as a steamer, and I therefore thought it was better to make any calculations upon the subject according to what is known upon the Medea, than to make them upon any plans of my own.

971. What is the Medea?—It is one of Her Majesty's frigates, which I saw in the harbour of Aleppo; she carries two very lage guns, and two small guns upon the main deck.

972. Will you state the plan that you would propose for carrying this steam communication into effect?—I should propose that a sufficient number of steamers of 800 tons and 220 horse power be placed on the whole line between Calcutta and London, and Bombay and London, taking charge throughout the whole distance of passengers, parcels, specie, and cargo, the mails leaving London on the 1st of every month, and Calcuttà the 15th. As there is only two-thirds of the distance to Alexandria that there is between Calcutta and Suez, the mail from London of June will thus meet the Calcutta mail of May in crossing Egypt, and no detention beyond the week allowed for the crossing of passengers between Suez and Alexandria, and *vice versâ* which in case of any unforseen delay may be shortened even perhaps to three days, as stated by Mr. Peacock, will in any event take place. Thus the London mail of 1st June, touching and changing steamers at Gibraltar, and touching at Malta, will arrive at Alexandria about the 19th, and the passengers will be ready to embark at Suez on the 20th. The Calcutta May mail will leave Calcutta on the 15th of May, and touching at Madras to take in mails and passengers, will reach Galle on the 23d, and taking in coal, depart for Socotra the following day, where it will arrive on the 2d of June, and meet the Bombay steamer, transferring the passengers and mails, &c. immediately to another steamer, to be in readiness there, it will reach Camaran in four or five days, say the latter, which will make the 7th of June, and there take in coal; it will reach Cosseir in the same time, say, allowing a day's detention for coaling, on the 13th, and Suez in less than, or say in, two days; this will make it the 15th of June. The Committee will recollect that I have stated that the passengers from London would be in Suez on the 26th to start. The boilers and flues may be thoroughly cleansed, and the engines repacked before the 26th, the day for her returning with the June mails from England. In like manner, the Indian passengers and mails will cross to Alexandria by the 22d of June, and proceed to England, only transhipping into another steamer at Gibraltar, where they will arrive by the 11th of July; 57 days from Calcutta. The Committee will allow me to state why we are very anxious that this plan should be adopted. I am satisfied myself that it is the best and the most efficient course, and would be the cheapest in the end, because I am perfectly satisfied that after a short time, I very much underrate the intercourse there would be between the different presidencies and London, by saying, that one half the passengers and one half the letters would go by that route, and (what seems to be the most difficult matter in any other way) that families of children would invariably go by that route and not round the Cape. It would save the whole quarantine, which would be performed at sea instead of Malta. By transhipping at Gibraltar into a fresh steamer, keeping the Alexandria steamer in quarantine after the passengers quit her for ten days, during which time she might be efficiently fumigated, and allowing one or two days for inquiries after the passengers arrive in London, all the rest of the quarantine would be saved; and this seems to me the only method to induce families to send their children. It is impossible to interfere with the quarantine in the Mediterranean, because it involves all our relations with the whole of the continental ports, and if we were to make an alteration that would lessen the quarantine, the result would be that there would be a second quarantine to perform in the Mediterranean ports. If we keep it entirely in our own possessions at Malta, Gibraltar, and London, then we can by that means make any regulations that we like. By this mode a person might come home to London, and might be out again at Rome infinitely sooner than he could by leaving Alexandria, going to Malta, performing quarantine there, and going from thence to Rome by the speediest conveyance they could get. Supposing we

availed ourselves of the French steamers, it would be impossible to induce families to trust their children to vessels of that kind, with which they had no communication in Calcutta. Besides, the passage *through France would not do; but taking the route I have described, I feel no doubt that if the expense were made the same that it would cost to go round the Cape, almost every persons would go that way, and send their children that way. To do this properly there should be a treble line from Suez to Calcutta of two each, or six steamers, and two from Socotra to Bombay. The few days during which the engines would be worked in the month would probably enable these eight steamers to keep up a constant communication.* But Mr. Peacock has said that a steamer ought not to work more than 16,000 miles upon an average during the year, and therefore it might be safe to have two spare ones, one to be left at Calcutta, and the other at Socotra or Bombay, whichever would be most convenient, and this would be amply sufficient. I believe the steamers would do it without, because the runs would be short runs and the opportunity of frequent examinations of the engines, because if there is any improper friction it produces damage very quickly till the injury is remedied; but I believe that if you have a frequent examination the engines will go twice the length in the year that they will with the long runs. I consider that four or five at the outside would be necessary in the Mediterranean, keeping one constantly in quarantine at Gibraltar for 10 days after her arrival, during which the crews might clean the vessel. I consider also that the vessels upon the Mediterranean side would be much less expensive, both in coals and in repairs, because it is obvious that they can be done at infinitely less expense at home, and besides that, for coals they would have no tonnage to pay, except at Gibraltar and at Alexandria, therefore I do not allow the same rate for that; but I am satisfied that I allow a sufficient rate, considering what is done by the Peninsula Company's steamers, and better there can hardly be, if I am to judge by the one that I came in from Gibraltar to London; and I think in this way the whole expenses would be covered. The estimate that I make of it comes to 217,112 *l.* for the total expenses, and the probable returns 217,400 *l.*

973. Sir *John Hobhouse.*] That is to say, from postage and passengers and freight?—Yes; I have calculated the vessel at 800 tons, at 24 *l.* a ton. Now, I venture to say, that that can be done for 200 rupees or 20 *l.* a ton, if built in India, or they can be built at 20 *l.* a ton in London; I have calculated it a 24 *l.* and I have calculated the engines, with iron boilers, at 12,000 *l.* a piece. I do not consider that it is necessary to have copper boilers, they would add something to the expense; but even if you had copper boilers the whole of the vessel, such as I speak of, could be built for 31,000 *l.*; that is the ammount which Dr. Lardner has fixed for vessels on 1,000 tons, and with 300 horse power, which I consider unnecessary. The coals are the great expense, and that I have estimated on the average at 3 *l.* a ton; I am perfectly satisfied that there is no way in which the East India Company have been more imposed upon than in the coals, from one end of the matter to the other. Whether it is the original cost, whether it is the freight, or whether it is the expenses of landing and re-shipping, I consider there is a very great saving to be made; and I will state one thing which appears to me to be the strongest possible proof of it: When the Forbes went, under the orders of the steam committee of Calcutta, to Suez, she was directed to apply, in case of need of anything, to Colonel Campbell, the consul there, who is also agent to the East India Company, for assistance; in consequence of that she applied for coal which she was out of at Suez, and there was a quantity of coal belonging to the Company, then at Suez, and our captain there applied for that coal, and that Colonel Campbell would purchase other coal to replace it for the Company's vessel; Colonel Campbell did so. The Forbes left Suez with the Company's coal on board, which was replaced by Colonel Campbell at Alexandria; and we subsequently paid him 56 *s.* a ton, including the price of freight and carriage, for that coal, which they have stated that they cannot lay in at less than 6 *l.* a ton at Suez. Colonel Campbell, when I was in Egypt, repeated this to me again, and said, that in consequence of finding the great saving there might be to the Company for this coal, he wrote to them to say that he would undertake to get it laid in there at 3 *l.* a ton at the most, and that he wrote repeatedly, I think he told me three times, I am sure he told me twice, and he said that no notice was taken of his letter whatever, and therefore he ceased to write anymore. It is very important upon this subject that the matter should be well understood by people here, that there is a delusion practised upon the Company; one cannot suppose any wish of delusion to be practised, but there is a delusion practised upon them, by which the expense of steam navigation has been stated to be so high that they have for some time objected to embark in it. I am satisfied 3 *l.* a ton is the outside that it would cost.

974. Sir *John Hobhouse.*] Will you have the goodness to look over one of the papers which has been handed in by me, and to state whether the estimate therein given is not pretty much that which you think is a fair estimate *(The paper referred being shown to the Witness)*?—Certainly.

975. Will you look another estimate also handed in, the expense of the Mediterranean steamers, which Sir John Barrow gave to the India Board, which does not include the first cost, nor does it include repairs, but it includes the wear and tear and wages and other portions of the expenses; you perceive that that amounts to 6,915 *l.* Do you think that is about what might be fairly charged for the expense of a steamer?—I think in many respects it might; I have no scientific knowledge upon the subject. This estimate was made without communication with anybody, except that Major Head gave me the estimates which the provisional committee sitting in Crossby-square have made, and I compared them with this, and this is in some degree founded upon those estimates; but I know this to be made by an exceedingly clever man, Mr. Morgan, who is intimately acquainted with steam navigation in all its branches. My estimate is for a steamer larger than that of the Mediterranean steamer, both in power and size. The Medea is the foundation of my estimates, and I have taken it as near as possible to the Medea, which is precisely the horse power, and only seven tons less. I have estimated 10 vessels; I estimated the crews at, 400 *l.* for the captain, 200 *l.* for the first mate. 100 *l.* for the second mate, 60 *l.* for the third mate, 140 *l.* for the surgeon, who should also act [illegible]k, 600 *l.* for the engineers, 500 *l.* for the crew, and 300 *l.* for eight stokers; that would make 2,300 *l.* per annum for each steamer, for the wages alone. The victualling I have reckoned at 100 *l.* a month, the stores at 50 *l.* a month, and the repairs at 100 *l.* a month, making 3,000 *l.*

for each steamer; that is 5,300 *l.* for each steamer altogether. I have calculated crews for every vessel; I am not satisfied that that is absolutely necessary, because there never would be more than eight, according to this, running on the Indian side at the same time, and I am not aware that it is necessary to have a crew for every vessel, except such vessels as may upon an emergency be called into play. I have estimated the insurance upon half the cost at six per cent. I have estimated it at that, because I know that three per cent. for six months is the usual rate at the insurance offices at Calcutta for a vessel that is considered a good average vessel. I have reckoned a fund to replace the capital in 15 years at 2,066 *l.*, and the interest on capital at five per cent. 15,500 *l.*; that makes the whole expense come to 153,512 *l.*, exclusive of the conveyance of passengers across the Desert, and of the eight coal depôts that it would be necessary to have. I consider that passengers may be conveyed across the Desert, distinct from their feeding, at 5 *l.* per head upon the average. There are eight coal depôts; I calculate at 1,000 *l.* each depôt, and 2,000 *l.* for agency in Egypt; that makes the whole expense amount to 172,112 *l.* upon the Indian side. The expense of the London steamer I have calculated to Alexandria at 45,000 *l.*, making the whole come to 217,112 *l.*; and the returns I calculate at 217,400 *l.* The returns I make in this way: I calculate in round numbers 1,600 passengers, which is one half of the whole number to the three presidencies, at 95 *l.* a head beyond their cost; that comes to 15,200 *l.*; that is to London. Letters, at 2 *s.* each, I put at 15,000 *l.* I understand the Post-office has reduced it to 2 *s.* 6 *d.*; there is not much difference between 2 *s.* and 2 *s.* 6 *d.*, but the lower they make the rate of postage, the greater it will be; and I think soldiers' letters ought to have the privilege of going free as they do at present, and that nothing ought to be paid to the steamer beyond what the Government may pay for the convenience of their despatches. Parcels and periodicals I have calculated at 100 *l.* per voyage, which makes for 24 voyages in the year 2,400 *l.* They would be rather less than that one way, because there are not many coming from India to England, but as there are immense numbers going from England to India, the deficiency upon the one side would be made up by the greater amount upon the other. I have calculated 100 tons of merchandise, per voyage, at 10 *l.* per ton, exclusive of expense across the Desert, 24,000 *l.* The expence across the Desert would amount to certainly not more than 2 *l.*, but I should think not more than 1 *l.* a ton by conveyance by camels. The government and Indian despatches, exclusive of the Malta, Gibraltar, and Egyptian mails, at 1,000 *l.* a voyage, would be 24,000 *l.* I have calculated for the carriage of specie on each side of the Isthmus: I do not think there would be much across it, but between the presidencies I think there would be a considerable conveyance of specie. In the Forbes we carried two lacs to Calcutta, and we carried between three and four lacs from Madras to Ceylon; and I am perfectly satisfied that the whole of the specie which is sent now would go by those vessels. I do not agree with what was said by Mr. Peacock, that that ought to be given up to the captains of the vessels, or that the captains of the vessels ought to have anything whatever for the living of the passengers; they ought to have nothing to do with that. It is destructive of every comfort to the passengers, and destructive of every comfort to themselves to be placed in that situation. I saw it in two cases on board packet steamers, and I saw the great advantage that arises in a merchant vessel, where the whole of it is left to the steward; the captain receiving only a liberal salary from the owners, and the steward contracted for a certain sum. No persons on earth could be better fed than we were on board that vessel. I never had to ask for a thing, but I frequently had to refuse it when offered to me. On board the King's vessels I will say nothing. Nothing could be better than the arrangements on board the merchant steamer for everything, both for speed and for accommodation, and for the comfort of the passengers in every respect. I never can speak too highly of the Iberia, her commander, and steward and stewardess; she belonged to the Peninsula Steam Navigation Company. There is one great want at present in the Mediterranean steamers; there is no stewardess in any one of them, and it is impossible to expect that ladies will ever come a second time without them.

976. You say that you consider the arrangement for communicating with India only to Bombay as an arrangement that can refer solely to the conveyance of despatches and letters, and one that will be of no use except in that respect?—I did not intend to say that; I mean of no use to the rest of India. It will be of considerable use and advantage to Bombay; but there are very few persons who would take the trouble of going first to Bombay with the prospect of having, perhaps, a two months' voyage afterwards.

977. For the purpose of conveying letters and despatches, you were understood to say that communicating by Bombay was a satisfactory arrangement?—Satisfactory, if we cannot get a communication to Calcutta, but not satisfactory as compared with that, because it increases our expence. I think it increases the delay; certainly it increases very considerably the risk.

978. You think it does increase the delay?—I think it does.

979. It is in evidence that letters go from Bombay to Calcutta overland by the ordinary post in the period of from 10 days in good weather, to 16 under difficult circumstances; is not that the case?—I I think not entirely; I never received a letter in 10 days, and I have received a letter in 20; not very lately, but I think in the course of the last year; for I have had some little correspondence with Bombay, and in the course of the last year, before my leaving Calcutta, I have known it 17 days.

980. Is not it fair to say that the average runs between 10 days, the shortest, and 16 days, the longest?—Certainly; I think that would be a very fair and correct average.

981. Between Bombay and Madras, what is the average time of transmission by dawk?—I have not the same knowledge of that; I only received one or two letters from Madras while I was at Bombay; but the impression upon my mind is that it is about a 10 days' dawk.

982. Then, for the mere purpose of sending letters and despatches, you consider that the arrangement that has been now made is, as far as it goes, satisfactory?—As far as it goes; but that is not so satisfactory as what I have stated, upon another account,—that it is not so safe. I have received a letter from Bombay in a state that I could not read it, and I know that others have done so.

983. Is that an ordinary occurrence?—It is not a very unfrequent one; during the rains the despatches are floated across the Nullars in many instances.

984. You are aware of the objections that have been made by Mr. Peacock to a monthly steam communication by the Red Sea?—I do not remember any specific objections which he made.

985. *Chairman.*] You heard that part in which he said that the present establishment was only sufficient for a monthly communication?—Yes.

[illegible]

[illegible] n of the Red Sea whilst I was in the room ; [illegible] say that the whole of his evidence struck me as raising any valid objection whatever to a monthly communication by the Red Sea.

987. Then, so far as you are acquainted with the evidence given by that gentleman, you do not consider that it raised any objection that can be fairly called valid, to a mode of communication by steam by the Red Sea?—Not so far as I heard it.

988. Have you been at Malta?—I have.

989. Do you know the build and the power of two steamers that have been sent out, the Atalanta and the Berenice?—I heard them described the other day.

990. Are those vessels too large for communicating with and riding in the port or roadstead at Mocha?—I should say by no means; but there is this distinction to be always kept in view with reference to Mocha, there is an inner and an outer anchorage. The fact is, you can cross prefectly from one shore to the other, and the inner harbour is a kind of half-moon, formed by two points, on one of which is a castle, and upon the other of which there is a mount, which had formerly guns upon it for protection, within which they say that the water generally does not exceed about 11 feet; but so far as I saw of Mocha, I do not consider it necessary that vessels should lie within the inner anchorage; at the same time, I do not think Mocha a good port for a depôt.

991. *Chairman.*] In the examination of a former witness there are three places mentioned as depôts: the island of Perim, Mocha, and Camaran; will you state which you consider the best?—My opinion is, that in point of situation the island of Perim cannot be excelled, because it lies within 100 yards of the shore, and it has perfectly good anchorage; they can lie in perfectly good water either on one side or the other. But I consider there is one very serious objection; there is no population in the neighbourhood, and any that you get must be brought there, either for particular occasions or in perpetuity; besides which, there is no water, and, in forming a depôt, we must consider not only the convenience of arrival and departure of the vessels, but the living of those who are to form the depôt during the absence of the vessels; and I consider that Perim is very ill-calculated for the residence of any persons, from its want of water; but in all other respects I consider it exceedingly good. I had no opportunity of saying whether it would be healthy or not, because it is a remarkable circumstance that Mocha, without any appearance of being unhealthy, has been found extremely unhealthy, particularly at that point. I know one instance where two gentlemen were laid up with fever and ague at Mocha a considerble time, and it is considered particularly unhealthy; fever, ague, and dysentery, prevail there. I consider Camaran, in point of situation to be nearly as good as Perim, and infinitely better, if we are to go to Socotra; but, in connexion with Socotra, I think it infinitely better than any of them; it divides the distance better; as I understand, for I passed within sight of it, but I did not land upon it, it is an island supplied with water, which very few parts of the Red Sea are well supplied with, and there is a very good harbour there; and I should say that it is an excellent place for a depôt.

992. Mr. *Bagshaw.*] It appears that in the despatch that the Bombay government. on the 16th of September, 1836, addressed to the government of the East India Company, they state that the three last overland mails had brought despatches from London to Bombay in 58, 45, and 64 days; can you state whether they were conveyed from the Red Sea to Bombay in steamers or not?—No I cannot; excepting only I think that one was and that the other two were not; but a good sailing vessel can make the communication occasionally much faster than any steamer.

993-4. You agree in the following sentiments of the government of Bombay; do you feel that the same sentiments prevail in Calcutta and Madras, or would prevail provided a communication were made direct to Calcutta, in the same way that it is projected now to make it direct to Bombay?—It runs as follows: "We have witnessed the energetic impulse this early intelligence has given to the mercantile interest and the unbounded satisfaction it has diffused throughout all classes of the community; it is indeed undeniable that a quick interchange of information is of the first advantage in commerce; and, in the conduct of all public business, while it is equally true that the effect on the minds of those who serve the Hon. Company long and faithfully in this distant land is to deprive the painful feeling of separation from their homes and country of half its bitterness. We beg respectfully to press these reflections on the notice of your honourable court, with our earnest prayer that you will ere long grant to India the much desired boon of frequent and regular communication with Europe, by the employment of a sufficient number of steam vessels for that purpose"?—With regard to the satisfaction with which they would hail the establishment of a steam cammunication direct to Calcutta, I have no hestitation in saying that it would give the greatest satisfaction throughout India; there is the warmest interest felt in it throughout India, especially in Calcutta; but when I mention the satisfaction which would be given by this measure to all persons that receive private letters, I should say that though it is a matter of great happiness to receive them rapidly, yet to merchants it is not so; it is regular communication that they want, and if they can have it speedily, also, it is of course a great object; but if they are to have one come in two months, and another in eight months, it is an injury rather than an advantage to them.

995. Then you consider the benefits to be derived to India altogether by steam navigation would be very great?—Certainly, in every point of view.

996. Are the natives taking a very warm interest in it, and have subscribed very liberally to it?—They have, very liberally.

997. Is not that a new feature in the native character?—Upon the country it is, but not in Calcutta or in Bombay.

998. Do you think that many natives would come to this country, or send their sons here to be educated if we had a steam communication?—I have no doubt that some would in the first instance, and I have no doubt that many would ultimately; I say that rather advisedly, especially with reference to Parsees at Bombay, and not only Parsees, but some others have expressed the same; I had occasion when I was there to see the schools which have been established by the education committee, and have had a great deal of communication with the different Parsee members of them as well as other persons, and they one and all expressed a great desire, and said they should send their sons to England. There was a young Parsee here last year, who had returned by way of the Red Sea, immediately before I was there; he had benefitted very greatly; no person could see him or communicate with him without seeing what advantage he had derived from his visit to England; he was totally unlike all his countrymen in the place; he was coming again, and to be accompanied by another. I expect another Parsee to arrive every day upon matters of business; not for the purpose of education, for he is a middle aged man; but I am perfectly satisfied that if steam communication were once established, and particularly if it were established in connexion with some system of education, if we had some classes for their education in the universities of London, or wherever else might be thought proper, they would gladly avail themselves of it, particularly if honours and degrees here were made the foundation of promotion in India. It is only in that way that I think we can to any useful extent avail ourselves of the assistance of the natives. I am one of those that regret extremely that the experiment that we understood was to be tried with reference to one native in Bengal was not ultimately tried; I can only attribute its not being tried to their not feeling sufficient confidence in the natives The only way that confidence can be created is, by drawing the natives to England, and giving them English education and English ideas.

999. A quick communication by steam you think would have the effect of producing that feeling among the natives?—I not only think that it would have that effect, especially after a while, but I think nothing else would as long as the communication was kept around the Cape.

1000. And you think that would greatly benefit India?—Very greatly.

1001. And you derive your experience from a considerable residence in the country?—From a considerable residence in the country, and very general intercourse with a very considerable number of the natives.

1002. Sir *John Hobhouse.*] Mr. Peacock stated that for the conveyance of passengers he was confident that the passage round the Cape was preferable to the passage by the Red Sea, is that your opinion?—It is decidedly not my opinion; and if Mr. Peacock were to reside in India as many years as I have done, and to take as many voyages round the Cape as I have, and one voyage through Egypt home, I am satisfied he would change his opinion.

1003. Did you ever hear such an opinion as that of Mr. Peacock's expressed in India, or is it a common opinion there?—I do not think that it is; I have heard a great deal of discussion upon the question of steam navigation round the Cape, having taken an active part in the steam committee of Calcutta; when Captain Young was there in the Fergusson, he had then a project of establishing steam communication round the Cape by vessels of 15,000 or 16,000 tons, and in consequence of that I had a great deal of communication with him upon the subject. It was thought that for the convenience of the passengers it would be preferable; but I should say that is not the opinion of the people of Calcutta; the great advantage which it was thought would be derived from that was, their getting out goods in these steamers, which would carry very large quantities of merchandize, and that was the purpose of the communication round the Cape, I am sorry that Captain Young is not here, because he is perfectly aware of all that passed upon the occasion; I think it was in consequence of the advices from the Company not being so encouraging as they expected that the project was given up.

1004. Mr. Peacock has expressed a decided opinion that no return whatever could be procured from passengers; that is to say, that no portion of the expenses of such steam communication would be reimbursed from the payments which passengers would make; is that your opinion?—It is decidedly contrary to my opinion; I think it is erroneous upon the face of it; the more I examine it the more erroneous I consider it; and I will state why I consider it erroneous upon the face of it: if that were a correct opinion, what is it that maintains the steamer of the Peninsular Company to Spain, to Gibraltar, to Cadiz and Lisbon? is it passengers, or is it freight? They carry at the outside about 200 tons of freight; it must, therefore be passengers, and passengers alone, who pay them. What maintains the large Scotch steamers; is it passengers or freight? If on a short voyage the passengers will pay so well, the payment will be proportionate upon a long one. It is utterly impossible to suppose that those steamers would have run the time they have, if they did not pay. There is another reason, that Mr. Peacock gave himself: that it was the usual course for the captain to pay the Company one-third; that I know to be the common course in all cases, and in many cases more than that; but, if he pays them the third, the third must be profit at any rate; but if they can afford to pay one-third in a sailing vessel, where the voyages are very much longer, it stands to reason that they can afford to pay much more in a steamer, where the provisions that the passengers will consume are infinitely smaller than in the sailing vessel. If, therefore, 120*l.* is the price for a single passenger from Calcutta round the Cape, which we cannot take, upon the average, at much less than five months, if a man can afford for that price to feed his passengers pretty handsomely for that five months, and to give one-third to the shipowner, I should like to know what the steam captain could afford to pay to the owner to feed them for one month; it stands to reason that he could afford much more.

1005. You have stated that you consider the present establishment of three steamers insufficient for the monthly conveyance of mails backwards and forwards up the Red Sea, between that and Bombay?—I do.

1006. Do you consider that four would be sufficient?—I think four would be barely adequate; I think that five at least ought to be employed. If they were remarkably fortunate in not requiring repairs, and also fortunate in their voyages, and not meeting with detention at Suez, I think four might be able to do it, but not otherwise.

1007. Mr. *Mullins.*] Is it not your opinion that, taking into consideration the number of accidents that might occur from meeting with bad weather and other causes, it would be adviseable to have at least six vessels, with a view to a monthly communication?—I could hardly answer that question to my own satisfaction without working it on paper, because it is easy to say that a steamer will do so much; but you must provide a steamer to go at the moment you want it, and you must make your calculations accordingly; and it is for that reason that I have said that it would be better to have two distinct lines from Calcutta to Suez, making them meet upon the Desert; and by the arrangement I have proposed *there would be no detention either one way or the other.* I consider that what I have stated is more *than an adequate establishment for the whole communication, but I think I could not say that six were absolutely necessary without setting down and working it, and seeing when the departures would take place upon the one side and on the other, and that that should form a component part of the consideration in the answer to the question.*

1008. Mr. *Bagshaw.*] And great attention should be paid to the monsoons?—That may make a difference of some three or four days at the outside between Suez and any port in India.

1009. Mr. *Mullins.*] Do you think it would be desirable to have a spare steamer?—Certainly, I think it would be desirable to have a spare steamer, because some repairs could not be done in time; if it was necessary to take out the boiler, you could not get it ready in a month, and consequently it is necessary to have one spare steamer at least.

1010. Will you state your estimate of the expense from Suez to India?—If the communication were only to extend to Alexandria or Suez, and yet to yield which it probably would take 1,600 passengers, which would then only pay 70 *l.* a head net profit, and 150,000 letters, at one rupee per letter, the return would then be, passengers, 1,600, at 70 *l.* a head, 112,000 *l.*; letters, 150,000, at one rupee, would be 15,000 *l.*; freight, 100 tons per voyage, 24,000 *l.*; parcels and periodicals, at 100 *l.* a voyage, 2,400 *l.*; Government and Indian despatches at 1,000 *l.* a voyage, 24,000 *l.* that would make net 177,400 *l.* I have taken the sums upon which I make this calculation generally in the rough; I charge 100 *l.* for a voyage from Calcutta to Suez; I charge 95 *l.* from Madras to Suez, and 85 *l.* from Bombay and Ceylon to Suez; that is 5 *l.* more than what they pay at present; but I propose for that to take them across the Desert, so that it is in fact the same; and I deduct the difference for their living, that is 30 *l.*, which the Calcutta passenger would cost the steward, that is, 1 *l.* a head per day, and I am satisfied that 10 *s.* is ample to allow them for eating, per head per day; but I wished rather to err upon the right side than upon the wrong side. I am perfectly satisfied that an adequate steward will provide everything which is necessary, or even desirable, for passengers at 10 *s.* a head per diem; but I have in the calculation, for the sake of not having it said that I was understating it, allowed 30 *l.* for a passenger from Calcutta. I have allowed 25 *l.* for a passenger from Madras, and 15 *l.* for a passenger from Ceylon and Bombay; I think that 15 *l.*, upon the average, would pay the whole; that would make Calcutta, Madras, and Ceylon, at that rate yield 136,630 *l.* towards the expenses. The Bombay passengers would yield only 28,360 *l.* at the same calculation; but if they had every one of the letters at every one of the presidencies, the same as if the vessels went direct, you might add about 12,000 *l.* more, which would make it about 40,000 *l.* that they would yield, whilst the expenses to Suez would be 177,400 *l.*, not the expenses to Bombay only. I have another calculation upon that; that shows that the three presidencies, including Ceylon, would yield 136,630 *l.*, whilst Bombay would yield only upon the outside 40,000 *l.*

1011. *Chairman.*] Would the communication with Bombay alone or the more extensive one leave the greatest amount of deficiency to be provided by the Government, and upon what data or calculations have you formed an opinion upon this subject?—I consider that the Bombay line would leave a considerably greater deficiency than the general one. Thus, having six vessels, which I have calculated would be necessary for Bombay, at the same rate as the 10 vessels for the general line, at 17,740 *l.* per vessel, makes 106,440 *l.* the cost of the six, whilst the returns would be only 40,360 *l.*, that is, taking even that every letter would go that way that would go by the more extended line, leaving a balance of 66,080 *l.* against the enterprise, whilst upon the other, I contend there would be no deficiency.

1012. Exclusive of the commercial advantages arising from a speedy and regular communication with India, do you consider that it would be productive of any political or moral advantage?—I consider that it would be productive of the greatest political and moral advantages; I need hardly say, that a speedy and regular communication is of the utmost importance in time of war, both for intelligence and for sending forces, which it would seem there would be no difficulty in doing by way of Egypt. We are at peace, it is very true, at present, but it will take two years to establish a communication even by the Company, as we heard from Mr. Peacock. If that is the case, who can say that we may not be at war in two years, and who can say from which side that war may come, or make any calculation whatever upon it; I think, therefore, it is of the most vital importance to establish it at once, that we may be ready in case of war to have the advantage over those that we may be at war with. I consider at all times that it would be of great advantage to the Company, in retaining more willingly their civil as well as their military servants there, and giving them a greater proportion of their services, which, if it is an object to have at all, it is an object to extend. Every person that obtains a furlough now to the Cape might be allowed to return to England, which would only occupy him the same time. He should have reduced allowances upon coming home; but I venture to say, that every man that did not give up his allowances to come home, by which the duties of his situation would be more efficiently performed, instead of an acting person being put in; he also could return again in a short time. You might therefore cut off six months of the furlough at least of every person who comes to England; you might cut off a considerable time from every person that goes to the Cape; certainly those in the upper provinces, who have to come to Calcutta to embark, if they were allowed to go at once to Bombay and take their departure, would save further time and expense also. I think there are very great advantages in encouraging occasional visits to England, by both the civil and military servants of the Company; they go out extremely young there; I will not say their education is not finished, but education is lengthened here till 23 or 24, in the case of young men that go to the universities; therefore in the case of young men who go to India at about 19, and with military servants at 16, can it be said that the mind has been thoroughly formed at that age, and that it is not very useful for a young man to return again to Europe and to see something of European governments and institutions and customs; that is, I think, a matter of the utmost importance; it is matter of opinion, but that is the way in which it strikes me. I think also the advantage would be very considerable to the Company's army There has been a great complaint in India that the army is not in the same state of subordination as his Majesty's forces in England It is not for me to say whether that is true or not; but I am perfectly satisfied that it is very desirable that English ideas upon that as upon every other subject should be regulated from time to time by occasional visits to England. I am perfectly satisfied also that it is of the utmost importance to the efficiency of the regiments; all officers almost who have any means besides their pay sell out of a regiment ordered to India, because they consider it a perpetaul banishment for life, and that their life is insecure; but if they were placed within two months' reach of home, I have no doubt that very few officers would sell out. I believe that it is generally considered that the better officers, those who have most hope of promotion, who have most to push them forward, sell out; but it is desirable to keep those persons in the army, and to send the regiment out with its old officers as you do with its men. I am quite satisfied that this intercourse will revive and increase the attachment of all Europeans to their native country; and I am quite satisfied that it will create an intercourse and connexion between the natives and England which will be highly advantageous both to the one and to the other. I am of opinion also that it will add very much to the advantage both of the one and of the other that the resort of Europeans should be encouraged instead of disdouraged. Supposing it to be true that Europeans frequently misconduct themselves towards the natives (which I will notice shortly), I would ask whether it is not arising greatly from the distance they are separated from their native country, from their native notions, and from any means of appeal to their native country? But I say that it is not so generally. I do say that there are no set of men that have been more generally belied by reports than the indigo planters of Bengal, so far as I am acquainted with them. I do not pretend to know them much more than in the district of Jessore, and Bengal, and Kishnegore, and Midnapore; but I am satisfied that they have contributed greatly to the prosperity of the country. Almost every man, not in the Company's service, depends upon his own personal exertions for making money, which he can only do by connexion and intercourse with the natives; and is it to be supposed that they will make enemies of the very persons upon whose assistance they depend upon making their fortune? I am satisfied that they do no such thing, but that on the contrary, they are a protection and a blessing to them, both in this country and when they are oppressed by others. It is the general character of Englishmen in India, as it is in other places, not to oppress everybody that they come across. There will be tyrants in every place, and persons will abuse power and authority whenever they have it; but it must be recollected that it is the European who is out of the Company's service that is generally considered as a sort of rival, and looked upon with jealousy by the civil servants, to whose jurisdiction he is amenable there; and the difficulty would be for the European rather to get justice than for the native, because the prejudice would run against him, with the single exception of persons being upon terms of great intimacy with the civil magistrate. It was stated the other day by Mr. Peacock that he thought it a disadvantage in this respect. I think it is not a disadvantage, and I think he is mistaken upon that, as he was upon some other points with which he is not personally conversant, and which he takes merely from what he has heard from others, and that not always the purest source. I think myself there is a difficulty frequently for a European opposed to the natives to get justice, and that it is increased by the power which is given to the civil servants to decide, as we are told they are to decide merely according to their notions of equity and good conscience, which I do not consider is what they have a right to do; but I do not enter into that question. I am perfectly satisfied that everything whatever that shortens the distance between India and England, and brings India nearer to the public of the mother country, will give that which is the great want of India, the want of a public in India; for there is no public in India, and there is no power of control by public opinion over those placed at a distance from the presidency, nor even over those that are under the very nose of the presidency. I am quite satisfied that it will tend to check the tyranny and oppression which is imputed, I believe unjustly, to Europeans in India. I think it will check it on all sides; that it will promote industry, promote justice, and promote good government. I am quite satisfied that that to a very considerable extent will be the operation of steam navigation, and that the natives think so. It was stated by Mr. Peacock that it would bring home complaints, and he mentioned that as an objection. I consider it just the reverse, and it is one of the grounds upon which I should say it ought to be promoted, because it would then partially bring justice to every man's door; and the more you can do that, the more you answer the purposes of good government; and consequently, I think it is a strong ground why it should take place, instead of an argument against it, though I am aware that that has been considered a very considerable and strong argument against it. I think also that the vices of the Indians are greatly produced by their never having had anything but Asiatic education and Asiatic intercourse. Their vices are generally deceit, fraud, perjury, and cunning, which are the necessary consequence of ages and centuries of misgovernment and of tyranny. It was the only mode they had to get rid of the tyranny by which they were ground down. When we talk of the tyranny of Europeans, I should like to know whether the worst of it is a tenth part as bad as the tyranny of a bad zemindar. I could could name innumerable instances in which the tyranny of zemindars is a thousand times worse than the tyranny of any European; and the more you give them intercourse with Europeans it will give them juster notions on the policy as well as propriety of good faith and honesty. With reference to the moral effects of the measure, I have already answered that, because I consider it principally with reference to education, which I think would be very considerable, particularly with reference to medical students. I am satisfied that medical students and persons who once give themselves to study, which is foreign to the habits of the natives, will gladly seize any opportunity of improving themselves in it by coming to England, and I think that the great body of students in the Medical College in Calcutta, which is one of the best institutions that has ever been established there, would in all probability come to England to study, and I think they should be encouraged to do it. I am satisfied that one sensible man who has been educated and associated with persons in England would do more to promote the welfare, and to give juster ideas to his countrymen, than a hundred of those that have received the best education that India can afford. I think it would be well that whatever is done should be done in conjunction with the places that have been established for the education of the native population. I have no doubt that in conjunction with the steam communication, that would form a strong power for humanizing India.

1013. Mr. *Mullins.*] You wish it to be understood that all the advantages you have just been detailing are likely to arise from a general intercourse by steam communication with the different presidencies of India, not by restricting it to one presidency alone?—I think that the benefit will be far greater by extending it to all, because it will create a degree of emulation between different presidencies: one man that goes from Bombay will probably stimulate three or four to go from Calcutta, and the same as to the others. I think it is not only desirable for that purpose, but because I think it is the only way by which a greater part of the expenses could possibly be paid, and I have given a reason, and I am certain that the greater portion will be paid in less than three or four years, if it is once established to all the presidencies.

1014. Can you state what are the prices of the best Burdwan coals, and how many maunds there are to the ton?—I calculate 28 maunds to the ton; I think the price in Calcutta is six annas a maund. The Company contracted for five annas a maund for the best Burdwan coals. The price rose last year, in consequence of the great deficiency of it, and it is at 12 annas a maund, at which I myself as an executor sold coals to the Company, but the price of raising coals at present somewhere about from three to four annas a maund, but the coal they are working is, as it was here originally, the upper vein of coal, not the lower vein of coal; the lower vein of coal is always superior to the upper, and I make no doubt, that if there was a great demand for coal, so that it would pay for the working of an additional depth, they would procure as good coal as the general run of coal in England. There is great difficulty in getting the coals down from Burdwan. The Nullers are only navigable for three or four weeks in the year, and during that time they are obliged to collect all the boats they possibly can, to bring all the coal they have collected at the depôt down to Calcutta. The consequence of the scarcity is, that the price is very much enhanced beyond what it would be if there was a considerable demand and additional facilities given.

1015. Have they come to any depth in any of the coal pits?—Nothing that would be considered depth in England.

1016. If there was a regular communication by steam between the Red Sea and India would not the commerce very much increase?—I am perfectly satisfied that it would very much increase. Every article of Indian manufacture was readily purchased in my route. It would not do, on account of the expense, for the more bulky articles; but Persian carpets, the inferior kind of jewellery and beads, broad cloth of the coarser kinds, the coarser kinds of cotton, and things of that kind, would all, I have no doubt, be sold readily, to a small amount, in the Red Sea, and many things would be returned. The steamer would be capable of bringing out drugs, which are supplied by the Island of Socotra itself, to a great quantity; and I think also that they might bring a considerable quantity, even every voyage, of rice, which sells at a high price in the Red Sea. The price of rice in the Red Sea is from four dollars to seven dollars a bag. I myself sold some at 4 ½ *d.* at Mecca, which had cost me three rupees a bag at Calcutta.

1017. You have no doubt, therefore, there would be ample freight for the spare tonnage in the large steamers?—I have no doubt there would; but I think also from London and from Alexandria, collecting that which came from Marseilles, but I think machinery from France, books also from France, books and periodicals from England, plate from England, silks and ribbons, and all things of that kind, from France, to a very considerable extent, would be taken. I think dresses from both countries would pass backwards and forwards; shawls from India, and articles of value, and raw silk; and opium might also pass, to a small extent, but not to a great extent, because the direct trade in opium lies out of the route to Calcutta. Singapore is the first opium port upon the route.

1018. Mr. *Bagshaw.*] What is the situation of invalids at Calcutta who wants to go to sea in a south-west monsoon, and would it not be very much ameliorated in the event of steamers going regularly?—I think decidedly; there is frequently difficulty in procuring a passage either to the Cape or to England in the south-west monsoon, and the passage at that season is very bad for an invalid; the passage down the the Bay is exceeding tedious with an adverse wind and a high sea; the continual wet and heat are exceedingly prejudicial.

1019. Mr. *Mullins.*] Do you think it would be likely that any number of passengers would ever pass between Bombay and Calcutta in the event of there being any steam communication by Ceylon?—Not any great number; it would be confined to those whose business call them there.

1020. You do not think that ladies or their families would venture to cross to Bombay, or that it would be possible to make the journey safe for them?—Certainly not; it is quite impracticable by land for ladies. Perhaps a lady in strong health would be able to do it, but not without great inconvenience. At the season of the year that is best for travelling, as to the road, it is worse with regard to heat; you can only travel by night.

[Adjourned till Friday, at Twelve o'clock.

Veneris, 30*th die Junii*, 1837.

MEMBERS PRESENT.

Lord William Bentinck.
Sir J. C. Hobhouse.
Mr. Mullins.
Mr. Crawford.
Mr. Bagshaw.

LORD WILLIAM BENTINCK, in the Chair.

Captain James Barber, called in; and Examined.

1021. *Chairman.*] I believe you were in the East India Company's marine service?—Yes.

1022. How many years?—Twenty-three years in the Company's service.

1023. You also commanded a private ship for several voyages?—For 14 voyages; after that I was 23 years in the Company's service, and 12 years in the command of a ship; making 35 years in the whole.

1024. How many voyages have you made altogether?—Seventeen.

1025. You of course are very well acquainted with the Bay of Bengal?—Yes.

1026. Had you an opportunity of seeing the Atalanta and Berenice before they went out?—I had; I visited both ships.

1027. Do you think those vessels would have any difficulty in making the voyage from Calcutta to Point de Galle in the south-west monsoon?—Not the smallest.

1028. You know it often blows very strong up the Sand-heads, between that port and Point de Galle?—It does; but it is not a continuous gale. There may occasionally be gales, when it would be imprudent for a vessel coming from Bombay or Calcutta to attempt to cross; but that would only last for 24 hours, and very seldom occurs.

1029. Do you know the length of time the sea breezes prevail along the rest of the coast?—Yes.

1030. Then there would be no difficulty in a steamer, which would keep close to the coast, making that passage?—Not the least.

1031. Are you acquainted with the Point de Galle harbour?—I have been cruising off the west coast of Ceylon. I am not much acquainted with the harbour itself.

1032. Then in going from Galle to Socotra there is a strong current going round Dundra Head; do you think a steamer would have any difficulty in overcoming that current?—Not the smallest. The current at the extreme that I have known it runs 50 miles in the 24 hours, and in the south-west monsoon, I should say decidedly the preferable passage would be to go through the one and a half degree channel. It would expedite the passage to Socotra, because the boat would make the channel, and have a strong south-west wind to carry her through, and there would be no difficulty in any part of the passage.

1033. Then if the machinery were to be damaged in any way, she could under go sail to Socotra?—Yes.

1034. Were you ever at Socotra?—I never was at the island; I have been in sight of it.

1035. Where were you coming from when you were in sight of it?—I was going from England to Bombay.

1036. Should you apprehend there could be such a sea about Socotra, which is about 75 miles in length, as to prevent the approach of a powerful steamer to its harbour, or to the roadstead, where it would take in its coals?—Decidedly not.

1037. I believe you are at present an East India agent?—I am.

1038. Have you a reason to know that there is a great desire on the part of Indian officers to go by a steam communication if it were established to India?—There is not a day passes but officers in the civil and military services inquire at my office how the thing is progressing. They would go by it immediately it was established. I also hear of it at the Oriental Club, frequently.

1039. Then you think if there were only a sufficient number of good, convenient, and powerful steamers that route would be generally taken?—Yes; no doubt they would be more than filled.

1040. Do you think if a steam communication with India were established it could be extended to any part of our colonial possessions to the eastward of India, with New South Wales for instance?—I have no doubt of it. I have been in communication with some of the first Australian merchants in the city, and they are exceedingly anxious to have this passage established to Calcutta, intending themselves to take on the communication from Ceylon to Australia, as they are constantly complaining that the return of letters from Australia occupies so long a time although they go to Australia with pretty fair rapidity.

1041. Do you mean the communication to India, or the communication to England?—The communication to England. There is at this time a company formed for communicating with Ceylon, anticipating the main stem would be carried out.

1042. Is that company actually formed?—Yes, and the boats are actually built.

1043. If a communination were made to Point de Galle, it would be more convenient to the Australians to come to Point de Galle than to Calcutta, as it would be half the distance?—Yes, and the communication would be equally convenient with Sumatra, Java, and the whole of the Australian Archipelago.

1044. Mr. *Mullins.*] Between what points of Australia do they purpose a communication should be established; do you mean New South Wales?—At Melville Island; that is the northward point. Our calculations and contemplations were to carry it to Melville Island, and to have a depôt there, leaving them to form local companies in Australia to carry it to other points.

1045. Then your plan would not go beyond Melville Islands?—No; but upon consulting with the Australian merchants upon that plan, they were amazingly pleased with it, and said they would not trouble us to go so far to the eastward as to Melville Island, as they would themselves carry it further.

1046. *Chairman.*] Do you think a mere communication to India, in the first place, would be sufficie allowing the comprehensive line afterwards to grow out of it?—No; on the contrary, I think it w be a marplot to the comprehensive line being established, for the very great expense which must necessarily be incurred in carrying steam communication to Socotra alone, and from thence to Bombay unless met by the revenue which can be derived from the comprehensive line to Madras and Calcutta will so far exceed the revenue to be derived from the transit of the letter bags, that I should contemplat the speedy abandonment of the plan, the receipts falling so far short comparatively of the expenses.

1047. Then you conceive the comprehensive plan would be, in fact, much cheapest?—Decidedly, and the one that would insure the permanency of steam communication with India.

1048. Have you made an estimate of the number of steamers necessary for the comprehensive plan, and the expense of the whole establishment?—I have.

1049. Will you state it?—I propose there should be four efficient boats, of 600 tons, and adequate power, which would cost 100,000 *l.*

1050. What tonnage and power would you give to each steamer?—Six hundred and fifty tons measurement, and 180 horse power.

1051. Mr. *Mullins.*] Why have you thought of limiting them to that power?—At starting, or during the first five or six years, I consider those boats will be of sufficient size to meet the wants of the traffic. To have them larger would be more expensive.

1052. But it does not appear you have looked to the obstructions from the wear and tear of the machinery and the want of expedition?—Yes, I have made allowance for those obstructions from the wea and tear of the machinery, which, if you had larger sized boats, would increase the expense considerably.

1053. Are you not aware that the larger the size of the boats, the less wear and tear there woul be?—No, it is quite the contrary; I believe the wear and tear increases in proportion to the size. I propose that those four boats should be employed in rotation, as follows:

No. 1. To leave Socotra January 1; arrive at Calcutta January 19.
No. 2. To leave Socotra February 1; arrive at Calcutta February 19.
No. 3. To leave Calcutta January 1; arrive at Socotra January 19.
No. 4. To leave Calcutta February 1; arrive at Socotra February 19.

Thus, in succession, four boats will ply beween Socotra, Ceylon, Madras, and Calcutta; steaming at most (making every allowance for monsoons, &c.) 114 days in each year. And in the event of accident to a boat, by this system, the three would keep up the communication during the repairs of the inefficient boat.

1054. Have you ever considered how many days' work it would be advisable that a steamer shoul have during each month in the year, looking to the necessity of repairing, over hauling the machinery, an so on?—I have stated that each steamer will be in work 114 days each year.

1055. Do you consider that a steamer could work 114 days a year, and still be preserved in that efficient state of repair which is necessary at all times for the safety of the vessel and the passengers?—I think so.

1056. Have you had much experience of steamers?—I have had very little practical acquaintance wit steamers; but I have turned my attention to the subject for a length of time past, for the last 14 or 1 months pointedly and decidedly, and from all the inquiries I have made, I think that a steamer may b kept in work for 114 days a year.

1057. Have you ever taken a long passage in a steamer?—No.

1058. What is the longest passage you have taken?—The longest passage I have taken was fro London to Ostend.

1059. *Chairman.*] Will you state at what you estimate the expenses of that establishment?—I estimate the annual disbursements as follows:

DETAIL OF WAGES.

		£
Captain		400
First mate		150
Second mate		100
Surgeon		100
Carpenter		80
Gunner		50
Steward		50
Serang		30
Eight Lascars		96
Six Lascars		48
		1,104
First engineer	£ 300	
Second engineer	200	
Third engineer	100	
		600
Twelve stokers, at 2 *l.* per mensem per man		288
	£	1,992 × 4 = £ 7,96

VICTUALLING.

Captain, table allowance to provide table furniture of all kinds, and to mess mates, surgeon, chief engineer, and steward........	600	
Carpenter, gunner, two engineers	238	
1 Serang 14 Lascars 12 Stokers	162	
27	1,000 × 4 =	£ 4,000

Captain to be allowed 5 rupees per mensem.

	(*continued*) £
Coals................	20,000
Depôts and contingencies.	3,072
15 per cent. on 100,000 *l.* for wear and tear, and to keep up the boats.	15,040
£	50,040

I estimate the income as follows :

Passage money to be taken :

			£
£ 50	10	passengers to and from Calcutta, monthly, 240.......	9,600
£ 40	10	passengers to Madras coast, 240....	8,116
£ 30	5	passengers to Ceylon, including the straits, 120..........	3,000
	10	native passengers, 400................................	4,000
£ 20, from Socotra to Suez, 600 passengers annually, thus drawn into the main trunk, to Suez from Socotra..................................			8,400
			33,160

		£
Profit on passengers, allowing the captain 10 *s.* for victualling per diem..		33,160
20,000	aditional letters (if this route be adopted), at 2 *s.* 6 *d*.......	2,500
50,000	periodicals, &c. at 1 *s*..	2,500
100,000	newspapers, at 6 *d*..	2,500
200,000	letters, additional postage, at 1 *s*.....	10,000
Government despatches to Ceylon, Madras, and Calcutta, from England and intermediate places..		5,000
Law-deeds, parcels, invoices, samples, jewellery, treasures, &c....................		5,000
	£	60,660

I consider the number of passengers to be much underrated, if the many that will flow into this stream of intercourse (if it be opened) from the Straits, China, Batavia, and Australia be taken into calculation. Letters, periodicals, &c., from the foregoing places will also follow in proportion.

I have thus shown that carrying out the comprehensive scheme will even at the commencement yield a profit, in part discharge of the large disbursements that must unavoidably attend the accomplishment of measure to Socotra ; it will, in short, insure permanency to the undertaking; while, on the other hand if a contracted plan be adopted, however effective in itself, I can see the time when it will be abandoned on the score of expense, for the charge will be considered far beyond the advantages to derived. In carrying out steam communication to India, Mr. Peacock has wisely recorded, "Steam navigation would require to be carried on on a large and efficient scale. Between doing it efficiently, and not doing it at all, there seems to be no advisable medium."

1060. At what rate have you calculated the coals per ton?—Fifty shillings; and I should be glad to supply them for the money.

1061. Mr. *Mullins.*] What depôts do you take into consideration when you give that estimate?—I took Socotra and Galle. I should have depôts also at Trincomalee, Madras, and Calcutta. I have looked a great deal at this measure, and I do think Trincomalee should be the general depôt for steamers upon the comprehensive plan. You there meet with His Majesty's ships at all times in case of need of necessity. You could repair them there tolerably well, and it would form a magnificent harbour for half the shipping in the world, if you could get them there.

1062. *Chairman.*] Would you have any depôt in the Red Sea?—Yes, decidedly.

1063. Mr. *Mullins.*] But the four vessels you speak of are supposed to go merely from Socotra to Calcutta?—Yes; supposing you carry it to Socotra, as I suppose you must do, that establishment is to carry it from Socotra to Calcutta.

1064. How many vessels would you have from Socotra to Suez?—Three.

1065. That would be seven from Suez to Calcutta, upon the comprehensive plan?—Yes ; and two from Bombay to Socotra.

1066. That would be nine altogether?—Yes.

1067. Should you think it advisable to have all these vessels of the same size, or of different sizes?—The four from Socotra to Calcutta I would have of the same size in all respects ; the two from Socotra to Bombay of smaller dimensions; and the three from Socotra to the Red Sea of larger size, and larger power.

1068. Why have those from Socotra to Bombay of smaller dimensions?—The capacity they would require would be less for the conveyance of the packets and for passengers.

1069. Have you considered the monsoon seasons?—Yes; I consider that three months in the year the Bombay packet would not go by the steamers, but join the Calcutta boat at Galle.

1070. Then you think being of smaller size, she would be able to make the southern passage as well as a larger one?—I have no doubt about that: she will get down the coast under canvass without steam.

1071. And still preserve a regular monthly communication?—Yes.

1072. *Chairman.*] Both in the north-east and north-west monsoon, one of the passages, where it is favoured, will be made under sail?—Generally; almost always. Sometimes the north-west monsoon fails, and there is no wind; but, generally speaking, she could do so.

1073. That of course would produce considerable saving of fuel?—Decidedly; it has been taken somewhat into consideration in the estimate of expenditure, but not sufficiently; I thought it better to make a calculation that would stand the test.

1074. You allow only 10 *s.* a day for victualling the passengers; upon what data have you fixed that?—I have carried passengers; for 14 years of my life, and I fancy I have generally provided them as well as other ships of my class have done, and I consider 10 *s.* a day is an abundance at the present time. And I may mention that in this estimate I have put down the commander at 400 *l.* a year; but I think I should give him a small per centage, to make it a desirable situation to have, and then you would have a greater supply of fit men.

1075. Supposing the steam communication to be completed between India and Suez, will the Mediterranean packets form a sufficiently continuous chain to England?—I am decidedly of opinion they will not; there are many objections to them; they have neither speed nor capacity to perform properly the office they now undertake; if burdened with an additional charge from India, they would have less speed, and I think not be able to carry the number of passengers, parcels, and packets, which would arrive to be put into them. Coming by the Mediterranean packets, also, you would have to perform quarantine at Malta, which is a decided objection. I think, in the aggregate number of passengers from India, it would make a difference of 1,000 a year at least, and it would draw some of them into the French route. Now, I think if a boat were to leave Alexandria, and come to Falmouth or London, or any other part which might be fixed upon, if they would be within reach of their friends, you would draw from India a larger proportion of passengers than you can by any other means; and, moreover, you would have greater security for the conveyance of treasure, jewellery, &c., as well as your own despatches; any valuable property which might be committed to the charge of those steamers from Calcutta would be brought to London with greater despatch and greater security, by having a continuous chain of communication for that, and that alone.

1076. Mr. *Mullins.*] Do you not also imagine it would encourage a great number of persons residing in this country to go out to India, who would not form such an idea at present?—Decidedly. In my communication with families connected with the East, they have told me they would go to Egypt, and that would bring individuals from India to meet them in Egypt. They would stay a month visiting Upper Egypt, and after seeing what was to be seen there, they would return to England again.

1077. *Chairman.*] I suppose you know better than anybody that the greater part of the homeward cargo from India generally consists of children?—Yes.

1078. It would probably be an inducement to send them by the Red Sea, if there were a continuous route to London?—Yes; that is exactly what I wish to state.

1079. What is your opinion of that?—I have already stated it would make a difference of 1,000 passengers a year in the aggregate, and the attempt to do it on any other plan would entail a considerable expense, which you would not meet; but if it were done upon the comprehensive scale, with one continuous chain of packets throughout, I am confident it would not only pay itself, but would be a source of profit to whoever undertook it.

1080. Do you think there would be any cargo to England?—I think there would be samples, measures, and light cargoes, such as cochineal and other things. I am not an advocate for making packet boats cargo boats, for you obstruct their speed immediately you bring them down in the water when they start, and when you lighten them too much they have not the same power in the water.

1081. But there are light articles, such as milinery, which might be sent from England?—Yes.

1082. And there may be valuable articles of small bulk?—Yes, valuable articles of small bulk, and light bulky articles will go by that route.

1083. Mr. *Mullins.*] In those light vessels you have been speaking of, how many tons of cargo do you suppose they could take, independent of the passengers and luggage?—I think they could take 50 tons of light goods.

1084. How many passengers should you calculate upon?—Those boats are only calculated for 40 passengers.

1085 Is it your opinion they could take 40 passengers, with every convenience and comfort which passengers going a long voyage of that description would require?—I think they could, as they would not have them so great a space of time on board. That number is far in excess of what they would have for some time. The calculation made for passengers going from Socotra to Bombay is only 10, though the boats would have a far greater capacity.

1086. Is it your decided opinion that a vessel of this size would take a sufficient supply of coals, and still retain space for 50 tons of light cargo?—Yes, I think so.

Major C[illegible]s *Franklin Head*, called in; and Examined.

1087. *Chairman.*] HAVE you given your attention to the subject of steam navigation to India?—I have given a great deal of attention to it for the last six or seven years. I came home by the proposed route six years ago, and on my arrival in England, I found many persons very desirous to communicate on the subject. I was requested to make out a report upon the practicability of the plan, which I did. I presented it to the India Board, to the India House, and also to His Majesty; and at a personal interview His Majesty wished me to continue my attention to the subject. From time to time I communicated in reference to it, and have various papers which passed between myself and the Government.

1088. What is your opinion upon the subject of a continuous communication?—My opinion is that it is quite practicable to any part of India to which it may be desirable to go. I expressed a similar opinion before a Committee, of the House of Commons, in 1834. At that time I brought forward a good deal of data, bearing out the grounds upon which my opinion was formed, both in respect to weather, and in respect to stations and distances, and the power and capacity of the steamers. I thought then it was quite practicable, and since that time many favourable circumstances have occurred. At that time the Island of Socotra had not been surveyed. I had been there, and made a report from personal observation; the Island of Camaran had not been mentioned. I had been there also and made a report from personal observation; those two stations are still recommended. The Red Sea had not then been surveyed, and now a complete survey is published. The Committee then came to a favourable report, and it will be thoroughly borne out by subsequent information.

1089. Sir. *John Hobhouse.*] With respect to the navigation of the Red Sea by steam-boats?—Yes; in fact in every particular.

1090. During all times of the year for a monthly communication?—Yes, this may be done.

1091. *Chairman.*] Are you of opinion that Socotra and Camaran are good places for depôts?—I consider they are the best depôts we can have; there are other places which may be made depôts, but I consider Socotra and Camaran are the best, from various causes.

1092. Were you ever in the Island of Perim?—I was on shore at the Island of Perim.

1093. How is that calculated for a depôt?—The position of it is very well calculated for a depôt; but I consider the Island of Perim has great objections. In the first place, it is uninhabited, and is a sandy low island, with brushwood and bushes upon it, and as to water, I do not know whether it produces any or not. It has nothing to recommend it for a depôt but its position, and I think its position is not so favourable as Aden, or not more favourable.

1094. Have you ever landed on the coast of Africa near Cape Gardafin?—No; I have read with a great deal of attention Captain Owen's reports of the East Coast of Africa, and Captain Boteler's, who surveyed it; and they have reported there might possibly be a good position found upon that coast, both for trade and occupation.

1095. Have they stated any particular point where it could be established?—No, they have not; I do not think their survey extended so far as Gardafin.

1096. Then it is a mere matter of speculation on their part?—Their report extends to the southward of that; and they remark on the trade that is now going on there, and upon the probability of an increased trade, and upon the injury of our not looking into the thing more than we do. The Americans hover about those parts a good deal; a great number of their vessels touch there. Captain Boteler remarks that the foreigners are possessing the trade which ought to be ours; they are increasing that trade to a very great extent.

1097. But still they have not pointed out any harbour or roadstead that is adapted for a depôt?—Captain Owen has given a map of the coast, but I have not examined it. I think, however, if there was a harbour found there, it would not be so useful to us as Aden or Socotra. They are a very wild set of people on that coast, and on the Arabian side they are extremely friendly and well-disposed. I have heard Maculla mentioned as a depôt which would be a very useful one.

1098. You do not think it would be so useful as Socotra?—I think Aden and Socotra would be more useful. I more particularly mention Socotra, because commerce would grow around that depôt, and there would be no occasion to change it at a future time.

1099. Have you formed any plan for completing a continuous communication?—I gave in a paper the the other day, which I believe is now before the Committee.

1100. I see you propose that the line should begin from England to Alexandria?—I do, for many causes, but more particularly in consequence of the economy; and as this matter has been kept back on account of the expense, I fear, if it is commenced in a partial or imperfect way, it may be lost to the public again, and a much greater objection may be raised against it than now exists. Therefore I should say it should be founded on a plan to combine all sources of profits, and be connected with Post office arrangements. With the present Post-office regulations it will not make a very ample return; for instance, I made an application myself to a stationer to send a pamphlet to India, and was told it could only be sent as a letter, so that of coarse it was not sent there at all. A monthly magazine, I believe, costs 25*s*. through the Post-office, which is tantamount to a total prohibition. Parcels are more out of the question than magazines, as they are also paid by weight.

1101. They will not receive parcels on board the Post-office packets?—I made the application, and I thought it desirable to put the Committee in possession of the above fact, for it is a point upon which the Indian community dwell as one of great importance, their being permitted to have publications of different kinds transmitted to them by this route.

1102. You mean periodical publications, and so on?—Yes; also invoices, accounts current, law papers, &c.

1103. You do not mean pamphlets and things of that kind?—I mean the monthly periodical publications

1104. They wish to be permitted to transmit them by mail;—Yes, by the packet, at a certain fixed price; at present they only transmit them as letters.

1105. You do not mean that they should go in the letter-bags?—No; but that they should go by the same conveyance.

1106. That they should be received into the packets at Falmouth, to be conveyed by them?—Yes.

1107. Sir *John Hobhouse.*] Is the Post-office to be the department which is to take upon itself the responsibility of that conveyance ?—I do not know who should be made responsible for the conveyance.

1108. The King's packets are restricted from taking any parcels ?—Yes ; they do not take any parcels because, I am told, they consider that letters may be enclosed in parcels, and therefore prohibit them altogether ; but the transmission of periodicals is of great importance, and with respect to the steam communication now established upon the Ganges, there are no persons feeling the benefit of it more than the publishers in Calcutta, and there is a great benefit derived from it, from the extension of periodical publications throughout India by the internal steam communication. That was established not without a view to its being finally a part of the steam communication with England and they look in the same way for the trasmission of monthly periodicals and newspapers and various other things throughout the country. I believe the West Indies are permitted to have those parcels sent out by the packets. The bearing of this is that the merchants in London consider that upon establishing that communication with India, at least 15,000 *l.* a year would be contributed towards the expenses, by the transmission of periodicals, invoices, law papers, &c. ; therefore if this sum of money were received on that account, of course it would relieve the public of this sum which is necessary to open the communication above postage alone.

1109. How many vessels do you propose to employ ?—I propose to employ five steamers between England and Egypt, each vessel having between 70 and 80 days' steaming a year. All the work on the Indian side would be performed by 10 steamers, each having from 70 to 80 days' work a year. It is a very curious fact, that in carrying the communication to India, if you divide the distance into three parts, the first being from England to Alexandria, the second being from Egypt to Bombay, stopping at Socotra, and the third being from Socotra to Calcutta, there is so little difference between the three distances ; the first portion of the work on the Europe side of Egypt requires 24 voyages, of 3,100 miles each, making the distance to be run 74,000 miles annually ; the second portion, between Suez and Bombay, includes in 24 voyages 73,440 miles annually ; the third portion takes, between Socotra and Calcutta, for 24 voyages, 74,640 miles annually ; so that in one voyage there is not a difference probably of more than 50 miles in distance.

1110. I believe that the inland voyages tally very much ; for instance, it is nearly the same distance from Calcutta to Madras as from Bombay to Ceylon, and it is the same distance, again, from Calcutta to Galle ?—Yes ; I therefore propose to divide the whole into three distinct establishments, as a matter of calculation. If the communication is extended throughout the East, of course that would not be necessary, the boats would then alternately succeed each other in the different ports ; if divided into three portions, the number of vessels to be employed will be precisely the same, therefore the expense which will be incurred by each of three portions will be nearly the same, with some little addition from the expense of the communication between Suez and Bombay to carry out this communication, as I before stated, it is proposed to have five vessels between England and Alexandria.

1112 Of what tonnage ?—That is quite a question depending upon the quantity of traffic. I think 600 tons would be sufficient ; they will carry everything that is necessary for the longest distances they have to run.

1113. Do you mean from England to Alexandria ?—Throughout the whole line ; I have therefore made my estimate upon that. I also propose to employ five vessels from Socotra to Bombay, and five from Socotra to Calcutta, with a spare vessel in India, making an extra vessel on the eastern side, to be used merely as occasion might require, without its being regularly employed, but only in case of emergency. There will, therefore, be five vessels on the western side of Egypt, and 11 vessels on the eastern side. This plan would give each vessel on each side from 70 to 80 days' steaming each year, which is looked upon as a very good proportion of time, and enables everything to be done in the way of repair at the depôts, also the engines to be cleansed, and so on. It could be done with a less number I think ; it could be done with four for each portion of the distance ; four from England to Alexandria, four from Suez to Bombay, and four from Socotra to Calcutta.

1114. Mr. *Mullins.*] You thought between 600 and 700 tons was sufficient for these vessels ?—Yes, with 180 horse power ; and she might carry from 700 to 800 tons.

1115. Is it your opinion that 180 horse power will be sufficient for a vessel of such tonnage ?—It would be sufficient ; a larger vessel would be more expensive. Economy being one object here, I think 600 tons is all that is necessary ; the vessel would carry 60 passengers, and fuel for 12 or 14 days, which is the outside of what would be required, and would give towage for parcels to the amount of 40 to 50 tons, which is all that would be enough in this communication.

1116. And looking to economy, do you really believe that would be the best sized vessel ?—Yes, looking to economy ; looking to convenience, a larger sized vessel would be better ; but as this has always been put upon the question of economy, it would be dangerous to incur a great risk in beginning this arrangement.

1117. Do you not think if larger vessels were to be built in the first instance, the returns from larger cargoes would meet the additional expense ?—The returns from larger vessels might be greater, but that is a mere matter of speculation in the first instance. We average so many passengers, taking a 600-tons vessel, and we do not average a greater number of passengers if we take a 1,000-tons vessel. The return of passengers is an imaginary thing, and therefore would make no difference in an estimate.

1118. If hereafter it were found that these vessels were too small for the purpose, on account of the increased rate, should you not then say there would be a great loss from the necessity of dispensing with those vessels and obtaining larger ones ?—No I should say employment will be found for those vessels. There would be a communication established between Socotra and the Mauritius, touching at Seyshalles, which islands are capable of improvement in various ways, and there would be a communication from Ceylon to Sincapore, which would go to China, and if the Dutch government would give it any encouragement to go to Batavia, and so on to Melville Island, the northern point of Australia, where at this moment an idea exists that a settlement might be established for trade with vessels in the China seas, for the exchange of what is called trepang, which is a great article of trade there, and which is carried to China in great quantities. Were there an English settlement in that port, it is believed the trade might be a good deal advanced.

1119. Then you are of opinion that those small vessels would be in demand sufficient to prevent any loss?—Yes; as in England, when larger vessels take the place of small ones, the small ones have been placed on other stations, and there has always been a demand equal to the supply that could be obtained. I may also mention that there is at this moment very great exertions making to establish steam communication upon the Indus, which would take some vessels in that direction. The countries on the borders of the Indus are now supplied, to a great extent, by goods coming from Russia, by way of the Caspian Sea; and Captain Burnes states, that to get through those countries, he was obliged to employ persons connected with that trade to enable him to do so. British produce being put by these means on the banks of the Indus at a cheap rate, would drive a great deal of Russian influence and trade from those parts. British goods are brought from Russia and sold cheaper than they are now carried by the present mode of communication from Bombay. The commerce upon the Indus has already began, and treaties have been made with the native princes to carry the communication as far as Hyderabad.

1120. Sir *John Hobhouse.*] Are you aware that the Imaun of Synd has expressed an intention to contract for two steam-boats to navigate the Indus?—I have heard so; and it is also understood that trade will extend very much upon other rivers as well as on the Indus. It has been confirmed by Captain Burnes that the trade may be carried up to Attock, 1,200 miles from the sea, and from Attock it might branch off to the west. I have seen some communication lately sent from India, speaking in a favorable manner of prospects and probable success of the trade by the Indus, and that it is now going on and likely to be extended.

1121. Mr. *Mullins.*] Have you understood that a company is actually formed for the purpose of establishing the communication between Point de Galle and Melville Island?—I have not heard of that company. A merchant in London mentioned to me that they had sent to him respecting steam vessels to form a communication between the Isle of France and Ceylon.

1122. That is not the same company?—No, that is different company; but it shows how greatly steam navigation is extending. It is peculiarly adopted for those seas, because, when you have trade-winds in a narrow channel, you are detained months, when a few days would carry you through the passage by steam.

1123. *Chairman.*]—You are chairman of an association for establishing steam communication with India?—I am.

1124. I presume you have received a great many communications from different persons interested in that project?—I have received a great many communications, and I should be happy to give the contents of them to the Committee; they are contained in these papers, which I beg to hand in.

(*The same were delivered in.*)

We should have had much later communications from India, which would have been much more satisfactory, as those in my possession only treat of the project as it was in its infancy. The circumstance of our letters of September not having reached Bombay at the time of departure of the last steamer in January, and those letters having been about 140 or 150 days on the road, is a strong argument why steam communication should be regularly established. It is expected that the September, October, November, and probably the December mail will have been conveyed to India by the same vessel from the Red Sea.

The association of which I am chairman was formed in consequence of the great delay that took place in establishing this communication to India. In reference to it a letter was received from Sir John Hobhouse of the 27th August last, requesting to be furnished, for the information of His Majesty's Government, with a plan and list of the parties prepared to carry out this measure; but that being at a time of year immediately after the prorogation of Parliament, many persons had left town; some were on the Continent. It is proverbially a dull time of the year also, a great depression was at that time beginning to be felt in the money-market; but notwithstanding, it must be considered a very strong demonstration of the feeling existing that we were able to send in, in the month of November, a plan for this purpose, with a list of subscribers for effecting it, which list is now on the table containing the names of most of the leading firms connected with India in the city of London. There were also representations made from the commercial parts of England, expressing a desire for steam communication to India by the Red Sea. By the accounts from India it will be seen that parties at all the presidencies were prepared to support the proposed arrangement for this communication as soon as a prospectus should arrive from this country to enable them to do so (the outline only having been received). In fact there would be no difficulty in carrying out the measure, provided it met the approbation of His Majesty's Government and the East India Company.

1125. Are you authorized to make to the Committee any specific offer with a view to carry this project into effect?—The last proposal to His Majesty's Government not yet being, as I am aware, disposed of, I have not another with me nor any further plan; but if such was required by His Majesty's Government there would be no difficulty in arranging it.

1126. Sir *John Hobhouse.*] At present you are not authorized to make any offer, the terms of which you think this Committee, acting on behalf of the House of Commons, should be acquainted with?—Nothing more than what has been already proposed.

1127. Mr. *Mullins.*] I think you stated you had been at Camaran?—Yes.

1128. Are you competent from your examination of it to form an opinion as to its being well adopted for a depôt?—I should think it is very well adopted for a depôt. It is a very safe and good harbour. It stands about 20 miles from the continent, and therefore it is safe against all Arab incursions, which are frequent in those parts. It also stands in a position to command a great deal of trade; because the coffee country of Arabia is immediately opposite. It is opposite Loheia, from which there is more trade than any other place in the Red Sea. I find the quantity of coffee which comes from there is not less than 11,000 tons in the course of a year.

1129. You are not aware that there is any difficulty in steamers getting into the harbour of Camaran ?—None whatever. I went into the harbour in a sloop of war, which I should think would draw as much water as any steamer; and I can also mention that numbers of ships have been there at different times. It is a place which was commonly resorted to as an anchorage in former times.

1130. You never heard there was a bar across the entrance ?—Not to prevent ships getting in.

1131. Is there any other advantage Camaran possesses independent of those you have mentioned ?—It has another advantage in point of trade. It stands opposite to Massouer, which is the great port of Abyssinia for trade. When I was at Camaran, I found boats that had come over from Arabia and Africa, also from Mocha. There appeared to be a bustling, nice business going on.

1132. From Abyssinia ?—Yes; from Abyssinia and Arabia there is a great interchange of commodities. There are about 100 families at Camaran. There is also a fort, which is a protection to the harbour, and when in the harbour it is as smooth as a mill-pond.

1133. Is it your opinion an advantageous trade and a lucrative one might be established by adopting Camaran as a depôt ?—I consider a lucrative trade might be drawn there by a European market being established. We got our goods there at a very expensive rate. Any communication of this kind would offer a great deal of trade to repay us for it.

1134. Looking at the past, have you any data to show the trade is likely to be increased ?—The people are extremely anxious to possess themselves of various commodites which they want, along the different parts of the Red Sea; and we found that they brought their commodites in exchange, and we had very little to give them. In one instance I may mention that some dragons's blood was exchanged with the surgeon, who gave what was thought a fair price for it; afterwards he found, by the London prices, he got, I think to the value of 10 *l.* for 5 *s.*

1135. In your former evidence, before the Committee in 1834, you stated, Mr. Salt observes that in Messouer the duties were in Mr. Salt's time (in 1809) 20,000 or 30,000 dollars annually, which, at 10 per cent., made the value of the imports 250,000 dollars annually; are you aware that amount would be likely to be considerably increased in accordance with his opinion ?—The opinion of Mr. Salt is confirmed in a satisfactory way by Captain Moresby, who made the survey of the Red Sea just alluded to. Captain Moresby says there would be no difficulty in establishing agents there, and Captain Moresby mentioned that coffee, cotton, and indigo are the spontaneous produce of the country.

1136. Do you think a like result would ensue from the establishment of a depôt at Socotra ?—I have no doubt that it would bring a great deal of trade to Socotra, for there is nothing European at present on this eastern coast of Africa. Looking back to Portuguese histories of those countries, which descrive them, when they discovered them they were rich countries, producing gold dust and valuable commodities.

1137. Can you give the Committee any opinion as to the likelihood of increasing the commerce of Egypt ?—No doubt there would be a great increase of the commerce of Egypt. The position of Egypt has only to be looked at to show the great increase of commerce it is capable of. In the intercepted letters of Monsieur Paussielga., the comptroller of the army to the French Government during its occupation of Egypt, it was stated, by seizing Egypt France would annihilate by degrees the East India trade, enter into it with advantage, and get into our hands the whole commerce of Asia and Africa. In another portion of the same correspondence, it was mentioned, with the possession of Egypt, in a few years, the plague and other evils which afflict and desolate it, would be removed, and give to agriculture and commerce an activity which would restore that country to its ancient splendour and make it the centre of universal commerce.

1138. Have you considered whether it would be better to make a passage from Cairo to Cosseir, or from Cairo to Suez ?—For persons who are going for despatch, Suez would be the station; for persons who are going for pleasure, Cossier, most decidedly, would be the station, by the route of Kennah, on the Nile. If that communication were established, there would be some iron steamers upon the Nile, which are extremely well adapted for that purpose, like the steamers now working on the Ganges, and there would be great intercourse by that means to the ruins of Thebes, in Upper Egypt, which are so attractive that few persons would pass without going to visit them.

1139. Do you think for the convenience of packages and parcels the communication by Cosseir, or by Suez, would be the preferable one ?—Decidedly the mail by Suez; but I think a greater portion of the passengers would go up the Nile. It is a very pleasant detour. By that means you would avoid occasionally a troublesome part of the voyage.

1140. Then you think that part of the sea called the sea Suez is more difficult for steam than the southern part of the Red Sea ?—Except for two or three months in the year, when the wind blows strong in the Sea of Suez, and it might not be found to be desirable for steamers to go beyond Cosseir in that season, because there is no absolute occasion for it; the distance from Cosseir to Cairo, by route, being sufficiently quick to overtake the packet in the time between proceeding by Suez and Cosseir to Alexandria; that is, you cross from Cosseir in the time requisite to carry on the communication, as six days is the time given to cross from Suez to Alexandria.

1141. Is the communication equally practicable and equally safe between Cairo and Cosseir ?— I was at Cosseir and at Suez. I landed at Cosseir, and went by Thebes and Kennah, down the Nile to Cairo, and across to Suez, to look at the country. When at Cosseir a despatch was sent to Cairo without any difficulty; it was sent as a matter of course, and I found afterwards that it reached Cairo in seven days. There was no particular arrangement made; it was merely sent by an ordinary Arab conveyance.

1142. Are you aware that there is a better supply of water from Kennah to Cosseir than between Cairo and Suez ?—The supply of water decidedly, in the Desert of Cosseir, is sufficient for travellers. The wells may be easily deepened. They are now very much neglected. There has been a boring made in the Desert of Suez, and water has been found.

1143. At what depth has it been found ?—At no great depth. In the first instance they gave up when they came to the rock, but afterwards they went through the rock, and soon found water. I do not think the whole depth was above 24 feet. They came to clay, and they found in the clay sufficient water. It was an experiment made by Englishmen, employed by Mr. Briggs of Alexandria.

1144. You refer particularly to the Desert of Suez?—Yes. In the Desert of Cosseir there are several wells. I have already stated they are in an indifferent state, but capable of improvement. There is no one to superintend or protect them, and they are filled up with stones or anything else.

1145. Have you any reason to know whether the Pacha of Egypt would charge reasonable duties for the passage of goods between Suez and Cairo?—My opinion is, that this country can always influence the Pacha of Egypt, because the revenue of Egypt is raised principally, or to a large extent, by supplying Arabia with grain and other produce, butter, oil, &c.; and this steam communication will command that trade completely, therefore the Pacha's revenue being in question, would oblige him to submit to any reasonable terms which the British Government might require.

1146. Then your opinion is, that it would be to the interest of the Pacha of Egypt, or any of his successors, to sustain and encourage this communication?—The Pacha of Egypt has expressed his desire for the communication. I had an interview with him. He spoke to me about the route to India, and expressed himself much interested in it. He has done so to other persons. He is ready to enter into any fair arrangement which might be offered. As to the present conveyance that is carried on, which is the conveyance of passengers, he makes no difficulty about it, and does not interfere, except to see that they are treated with civility and kindness by his authorities. You make your bargain with the natives for the number of camels you require, which you obtain at a very reasonable rate, so much so, that you can carry a ton of goods across the Desert for 20 *s*.

1147. Do you think it would be for the interest of the Pacha and his successsors, independently of any friendly feeling, to encourage the British communication through Egypt with India?—The Pacha feels it is his interest, and is anxious to forward it. He is disposed in every way to favour it, and contribute towards it, and has offered to establish a railroad by way of facilitating it.

1148. Do you think, from the information you have upon those subjects, that from the effect which the British communication with India through Egypt would have, his successors would be guided by similar principles?—Most decidedly; it is the interest of Egypt to have that communication; so much so, that there is no reason for supposing they will not at all times give every facility to having it continued, and for improving and enlarging it as much as possible. Egypt is a very impoverished country, and the money which would be spent by passengers passing through it would be of immense benefit to the people.

1149. Have you considered what sized iron boats it would be advisable to have upon the Nile for the purpose of carrying on the communication?—They ought to be boats drawing no more than four or five feet water; boats very much like those sent out to the Ganges, perhaps two feet and a half. I went down the Nile at about the lowest time of the river in December, and I found there would be no difficulty at all in boats of the description I have mentioned navigating it. In the same way steam-boats would navigate from Alexandria round by Rosetta to Cairo, so that you would have no difficulty at all in making the communication.

1150. What is the tonnage of those boats?—They are about 60 tons, and they have a boat in tow generally. There are two of them, and one is a tug-boat.

1151. Have you ever understood there was a description of coal in Syria which is likely to be available for purposes of steam navigation?—Yes, coal has been found there, and it has been supposed it would answer the purpose perfectly. It is not yet worked out: it is merely in its infancy; but it has always been looked to as being likely to be brought forward, and to benefit steam navigation in those parts.

1152. You are not aware whether it would be a matter of importance to work those mines, looking to the cheapness with which coal may be delivered at Alexandria from this country?—Vessels go out in ballast so much from Liverpool that they take out coals in freight; and I mentioned to the Committee of 1834 an estimate given to me by a merchant in London, who offered to deliver coal at Alexandria to any extent at a very moderate sum.

1153. Have you formed any calculation as to the rate at which coal might be obtained at present, in the event of a regular communication being established?—I have formed a calculation throughout the line; I estimate the cost of coal between London and Alexandria at 30 *s*. a ton.

1154. Do you suppose that description of coal the Liverpool vessels take out in ballast is that which would be used with the greatest economy?—That would be the coal which would be used generally, and that coal would be carried across to the Red Sea, to Suez.

1155. Do you think it would be the best mode of conveying the necessary supply to Suez?—It would be decidedly more economical than any other mode of supplying it, particularly as the mode has been to bring it from India to the Red Sea at an enormous expense; they put their coals down at 6 *l.* or 7 *l.* a ton. I have a note here from a coal merchant, who says he should be glad to supply steamers with any quantity of coal, suitable for that purpose, at 1 *l.* 14 *s*. per ton (that was in 1834) at Alexandria; and another gentleman gives an estimate of his being able to supply coals at 40 *s*. per ton at Bombay; so that upon that the calculations are made throughout. During the south-west monsoon vessels going to Bombay go very near the Island of Socotra, they approach within 200 or 300 miles of it, and that would enable them to bear up to the Island of Socotra to deposit some coal there, and then proceed upon their voyage; so that it is probable the extra expense would in a very short time be no more than 10 *s*. per ton above the Bombay price. I have, therefore, estimated the price of coal at Socotra at 50 *s*. per ton. I have supposed that in favourable seasons of the year coal might be carried from the Island of Socotra up to the Island of Camaran, and would be delivered there at 60 *s*.; and I have supposed that there would be no difficulty in getting them to Suez at a future time probably at that price.

1156. Is it your opinion, that under no circumstances would the price of coal at Camaran or at Suez exceed 60 *s*.?—That, I think, would be the outside. I think when the passage is known, and the navigation is better understood, the price will fall; and this is confirmed by the opinion of Captain Wilson, who commanded the Hugh Lindsay up the Red Sea. He mentioned in his report, that a mercantile gentleman in Bombay stated his opinion that the depôts could be supplied with coals at 25 rupees per ton;

but he adds, let us say 30 rupees, to be on the safe side; he says, in all probability they could be supplied for 25 rupees, but he takes 30, to be on the safe side; and that is the estimate he forms.

1157. Should you think it advisable to have any other depôts on the coast of the Red Sea?—No other is requisite.

1158. Not at Mocha?—There might be some coals laid in at Mocha and at Jiddah; but few of these *steamers would have communication with those places. They might take in coals if they wanted any, and so they might take in coals at the Maldives of which they have sent a plan from Calcutta, and where there is reported to be safe anchorage.*

1159. At which of the Maldives?—It is the Island of Heavandoo, which is one of the head of the Maldives surveyed by Captain Moresby.

1160. Is that one of the southern islands?—No. It is the northern Atoll of the Maldive Islands.

1161. Do you think it would be advisable to have a depôt at Heavandoo?—There might be a deposit of coal there to afford a supply in case it is required.

1162. What is your opinion as to the price of coal between Bombay and Suez, Mr. Peacock having stated it to be 5,000 *l.*?—I should wish to say that that calculation was formed upon the original estimate which was mentioned by Mr. Peacock before the Committee of the House of Commons in 1832. It was calculated in this way: the coals were purchased in London and freighted to Bombay, costing in the first place about 34 *s.* per ton in London, freighted out, say 20 *s.*, and as much more to the Red Sea; and then freighted from Bombay, raised them to about 5 *l.* per ton; and then other expenses were thrown in, making 7 *l.* per ton. Mr. Peacock stated before the Committee in 1834, that coal was sent direct from Lenellah by a ship freighted for the purpose, and those the best possible coals for steamers, hand picked on board, cost only 34 *s.* a ton, landed at Bombay, which quite removes the alarm as to enormous expense, as in the first instance.

1163. Then your opinion is that the evidence Mr. Peacock has given is not founded upon data which the Committee would be justified in assuming as correct?—Not correct data at the present day. Those coals were sent probably before the thing was understood, and they were sent in that roundabout way; and that is the estimate of 5,000 *l.* which was calculated as the cost of the Hugh Lindsay in each trip, and is still taken into consideration in Mr. Peacock's evidence at the present day. I also wish to mention that the expense of the Hugh Lindsay has no affinity, and nothing to do with the steamers which would be now employed, as to comparative expense. She was a vessel built only to carry five days' supply of fuel; she is in this voyage laden for 12 days. She was built for a man-of-war, has a speed of four or five miles an hour at first, and she attains only a speed of eight miles; she is therefore going at double the expense which a steamer properly suited for the purpose would do.

1164. Do you think, looking to the accommodation of the passengers, and their safety and comfort, it would be advisable that the captain should have any control over the provisions, and of providing them during their passage?—I think if they were provided upon the plan of the free-traders, which now go backwards and forwards to India, there could not be a better arrangement. They give very general satisfaction to their passengers.

1165. Will you state in what way they are provided?—I am unable to state accurately; I believe there is an arrangement made between the captain and the owner of the vessel. A certain allowance is given for the passengers, and he takes the rest under his control. It would be a proper arrangement to be made with a private company; but in a Government establishment it is difficult to say how it could be best done. The present system does not give general satisfaction, and it is difficult to know how it could be improved in a Government establishment. In that respect I could not offer any suggestion. I do not know the particular arrangement that is made.

1166. Do you think the combined plan preferable to the single one to Bombay?—Certainly. The reason for recommending attention to the combined plan is to insure the plan to Bombay being in the first place efficient, and being kept up, because the general benefits being so much more extended by the combined plan, that even if the net expense by that means is not reduced, there would be a greater recommendation for its continuance; also as great moral benefits are expected to arise from its being connected with internal navigation of India by the Ganges and the Jumna; and as steam navigation altogether has been considered so much as a matter of expense, there would be great danger to the cause from insufficient returns causing it to miscarry. For that reason also I think it would be necessary for the communication to commence upon a plan which may be carried out to the full extent, even if it is not so immediately.

1167. Sir *J. Hobhouse.*] You have heard that objections have been made to Mocha as a fit depôt for coal; do you know any place in the neighbourhood where a depôt could with great advantage be formed for that purpose?—Immediately out of the Red Sea, at the Harbour of Aden, which is not more than 100 miles by sea from Mocha, and a shorter distance across the country; perhaps only 80 miles. There is an admirable bay where steamers can lie at all times near the shore, and where there is water in abundance.

1168. It is well adapted for the shipment of coals, in fact?—Yes. By having coal there, probably 10 *s.* per ton would be saved in the price of coal. One of the great expenses in freighting vessels from England is getting in and out of the Red Sea, in consequence of the fixed or trade winds. The passage is very narrow, and vessels are frequently forced to put back after making the attempt to get through the Straits of Babelmandel. At the outer anchorage at Mocha the winds are very frequently so strong as to make it very difficult to communicate at all with the shore. Under these circumstances it would be very precarious to supply coals for a packet establishment, from the risk of detention likely to occur.

1169. Mr. *Mullins.*] Is Cossier a safe harbour?—Cossier is sufficiently safe.

1170. Will you state whether you have formed any opinion as to the political considerations why the occupation of the Red Sea, in conjunction with steam navigation appears desirable?—I have. In this case a fleet having naval possession of the Mediterranean would at all times secure to Great Britain a certain intercourse with the Eastern empire. The eastern part of this route from Egypt to India would be secure and free from interruption, by our occupation of the Cape of Good Hope, and the consequent impossibility of any western nation sending and maintaining steam vessels in the India Ocean, where the prevailing weather and frequent calms would render any other description of force, in case of hostile collision, of little avail. The revenue of Egypt is principally divided from export trade and from commerce with nations bordering the Red Sea liable to interruption by steamers, and here the export trade of Alexandria could in the same way be controlled by the fleet in the Mediterranean; the co-operation and good faith of Egypt would therefore at all times be secured. There are places towards the lower part of the Red Sea where commercial establishments would bring on influential and extensive intercourse, and give rise to habits of industry and civilization among a fine class of people, who, if required to render assistance, as mariners or otherwise, are well suited for tropical service, and would be useful allies in commercial or warlike operations. The remark applies particularly to the natives on the east coast of Africa and Zanguebar, where the Americans have recently negotiated to be permitted to form establishments for trade. The occupation of the coast alluded to, including Zanguebar and the island of Socotra, by a maritime nation, would almost insure an entire command of the trade between Europe and the East, by the Red Sea, and perhaps by the Cape of Good Hope. It will be seen by Horseburgh's instructions for navigation to India, that during several months of the year vessels frequent the passage between the Island of Mosambique and the coast of Africa, and consequently are obliged to pass within a short distance of the Island of Socotra. On our western frontier of India the Indus river is navigable for 1,200 miles, from the sea to Attock, at the foot of inaccessible mountains. A great benefit must follow the introduction of commerce and navigation on that and the other rivers of the Panjaub. This can only be done by making the science of steam navigation familiar to our subject on the western side of India. At present there is but one steamer (the "Hugh Lindsay") belonging to the Bombay establishment. A native has already been induced to procure a steam vessel for the purpose of trade and intercourse between Bombay and Surat. Commerce is beginning on the Indus, and the expedition sailed for Lodiana in 1834. It is remarked in the Bombay paper that gives this information, that there is no want of enterprise among the natives to take advantage of this new channel for trade and speculation. If this commercial spirit is encouraged by steam navigation being introduced on the rivers of the Panjaub, many important points will be gained to this country. Commercial transactions will be extended, to the benefit of our manufactures, whilst political relations will be strengthened in that quarter, which is the vulnerable portion of our Eastern empire. From the neglected state of trade and manufactures with the natives in the vicinity of the upper portion of the Indus, commercial intercourse is now maintained between Russia and those countries by the route from the Caspian Sea. This trade of Russia is connected with abstract and political views, and tends to promote and keep alive disaffection in the Eastern world, at all times prejudicial to the interest of this country, and creates suspicion which may at any time lead to collision. The same reasoning that might be strongly urged to advance the enlargement of commercial connexion on the Indus is also applicable to the occupation of the Persian Gulf, and the rivers which flow in that direction. A doubt, however, presents itself in respect to the policy of improving navigation on the higher portion of the latter, from the circumstance of their having their source not far from the Russian territory. English merchandize introduced from the sea as high as Anna on the Euphrates, and to Bagdad and Mosul on the Tigris, both of which rivers are thus far accessible for steam navigation, would have great effect in checking intercourse and influence advancing from the north under the cloak of commercial connexion.

The expensive mode at present followed by England of supplying a principal portion of Arabia and Persia second-hand, *via* India, with articles of European manufacture, will in a great measure account for the political depression of British influence in those countries, as well as with the nations that border the Red Sea and the Indus.

1171. Have you any further remarks to make as to the commercial benefits and advantages of a general steam communication to the different presidencies?—In early ages the Red Sea was generally navigated for purposes of commerce between Europe and Asia; with the plans now projected for facilitating the transit of goods across the Isthmus of Suez by railroad, and through the adjoining seas by steam apparatus.

A question arises, how far the Red Sea will resume its ancient character?—Without at present going fully into this important investigation, I will remark on such points as present themselves to the minds of all who traverse by this route. The nations on both sides of the Arabian Gulf, and also on the eastern side of Africa, show every wish to exchange the produce of those countries for articles of European manufacture, such as gunpowder, fire-arms, light clothing, cutlery, ornaments, &c. As to the probable extent of such transactions there is no data on which to form any opinion. The mode by which those countries are at present furnished is most discouraging to the industry of the people. They have no direct intercourse with Europe, but receive manufactured articles, *via* Egypt or India, at double or treble the price if a direct intercourse was established. These remarks particularly apply to Arabia, Abyssinia, and the east coast of central Africa, Socotra, &c., which countries come in direct contact with the route in question. They have been almost totally lost sight of by Europe for centuries, and excluded from English enterprise in consequence of Mahommedan fanaticism to the north, and the East India Company's trade monopoly to the south. In examining the question, the free introduction of English manufacture is worthy of remark. Previous to the opening of the Indian free trade it was contended that no increase of trade in that country could be expected; and in a letter from the Chairman of the India House to the Right honourable Robert Dundas, in 1809, in reference to this question, he says the article of the first necessity (cotton) their own country furnishes more abundantly and more cheaply than it is possible for Europe to supply them. The effect of open trade in this article, has been as follows:

In the year 1814, the year the trade was opened, the export of manufactured cotton to India was	817,000	yards.
In 1815 it was	1,355,476	—
1819	7,127,661	—
1824	23,685,426	—

In 1827 it was	45,016,850 yards.
1832	51,833,913 —

The value of cotton exported in the above time increased from 201,182*l.* to 3,238,248*l.*; and the value of all exports from Great Britain in the same period increased from 1,874,690*l.* to 4,674,673*l.*: Finding this beneficial effect produced by free trade when so little was expected, its probable result in adjoining countries to India appear to be worthy of inquiry, more particularly as other maritime and commercial nations are contemplating their occupation for commerce. The exports of Arabia consist of coffee, gums, myrrh, senna, dates, balm of Gilead, aloes, and a great variety of valuable drugs. The annual exports of coffee from ports in the Red Sea is stated by Mr. M'Culloch, who furnished the above report as to cotton, to be 12,000 tons. The price of it in the London markets, taken at 100 *s.* per cwt., and supposing it was valued at the place of shipment at only 50*s.* per cwt., there would be 600,000*l.* available for trade by this article alone. From Abyssinia and the coast of Zanzabar are exported ivory, gums, frankincense, hides, and various drugs, also gold dust, sheep, which are now exchanged for broad cloth, light clothing, and cutlery, but the present state of that neglected country will admit of no opinion being formed of its capabilities. Mr. Salt, who visited Abyssinia in 1809, says, " that there is no part of the world where British influence might be exerted with more beneficial effect." The Ras, or King, expressed his gratitude to the King of Great Britain for regarding the welfare of this country, and expressed his anxious wish for intercourse between the two nations.

Some idea of the resources of those countries will be formed by looking into their state when first visited by the Portuguese about three centuries ago, and at that time they had declined in importance, by the barrier which the followers of Islaim had raised to cut them off from European trade.

Vasquez de Gama and other Portuguese navigators report that a great trade was carried on between the south-west coast of Africa and India, and with the Red Sea; that the produce of the country (Sofala), which they considered ancient (Ophis), was gold, ivory, pitch, and wax. They described several cities as places of great trade, and consisting of houses well-built, and streets conveniently disposed. From Melinda to Quilvoa, near 400 leagues of coast, they remark on as very populous and full of towns; also mention many islands bordering it that paid tribute. Quiloa is called an ancient and noble city, as a place of great trade for Sofala gold, for which there was great resort of merchants from Arabia. The Portuguese plundered this city, and attacked, plundered, and burnt many others which refused or neglected to pay sufficient tribute. They describe their frequent seizure of vessels, and of gold and silver, and altogether they began a reign of terror and rapine which could have no other effect than to put an entire end to intercourse along the coast or by water. Having ravaged the places within reach, they went up the rivers, one of which, the Cuana, runs 250 leagues in the country of Sofala, and is reported by them as famous for its gold sands. The back country mountainous, delightful, and well-peopled, and watered by many rivers. In 1513 Albuguerga arrived before the city of Aden, outside the Red Sea; it is described to be rich and famous for the resort of merchants of many nations, and situated at the extremity of Arabia, called Zemen, which was full of populous cities, fruitful, and of great trade.

The expedition entered the Red Sea, being the first Portuguese that had done so. He took four ships at the island Camaran, where he wintered; and on his return went to Zeyla, a city at the mouth of the Red Sea, on the African shore; and this he described as a great market, which, being unprovided, was easily taken and burnt. In 1548 they sent an expedition to Suakin, the port of Abyssinia, and one of the richest cities in the East; it was said to equal, if not to exceed, the most eminent places in goodness and security of port, facility in loading and unloading ships, and traffic with remote countries. No city that the author knew could be compared to it in commerce but Lisbon; it traded with both peninsulas of the Indies to Jiddah and Alexandria, besides its trade with Ethiopia and the land of the Abyssinians, from whence it had vast quantities of gold and ivory. The above is enough to show that, on the borders of the route in question, opportunities offer for commercial enterprise which it would not be our policy to permit to pass into their hands.

1172. Have you prepared any calculations as to the expense of the different communications; first between England and Bombay; and, secondly, from England to include all India?—I have; and the following is the result of my inquiries upon the subject:

Estimate of Receipts for Steam Communication with *Ceylon, Madras*, and *Calcutta*, in Excess of the same to *Bombay* only.

Passage, Suez to Madras	£. 60
Ditto .. .. Calcutta	70
Ditto .. .. Ceylon	50
Average for messing for each passenger, 10*s.* a day for 38 days.	
Net profit, say 47*l.* 10*s.* each passenger.	
Passengers annually between Calcutta and Egypt	320
Ditto .. .. ditto .. .. .. Madras and Egypt	402
Ditto .. .. ditto .. .. .. Ceylon and Egypt	40
	600

	£.
Total 600, at 47 *l.* 10 *s.*	28,500
Passengers between intermediate parts	3,000
Deck and steerage passengers	5,000
Newspapers, periodicals, invoices, law papers, parcels, samples, jewellery, bullion, &c.	15,000
20,000 extra letters between England and India, at 3 *s.* 6 *d.*	3,500
Intermediate postages	600
	55,600

Bullion, samples, periodicals, &c. between intermediate places	——
Profit, 30 *l.* each on the above 600 passengers between England and Egypt	18,000
	£ 73,600

	Arrivals.	Departures.
Annual number of passengers between Europe and Calcutta	767	665
— Madras	537	459
— Ceylon	85	17
	1,425	4,141
	1,141	——
	2,566	

246,011 letters are received and despatched annually at Calcutta, Madras, and Ceylon.

ESTIMATE of Receipts by Steam Communication with *Bombay* alone.

Passage, Suez to Bombay	£ 50
Deduct messing 20 days, at 10 *s.*	10
Net profit each passenger	£ 40

If steam communication is with Bombay only, there will be a greater number of passengers than otherwise from thence. The annual number of passengers that at present pass to and from Bombay are, arrivals, 287 ; departures, 316; total, 603.

	£
Say 400 passengers at 40 *l.* profit	16,000
For deck and steerage passengers	4,000
For newspapers, periodicals, invoices, law papers, parcels, samples, bullion, &c.	10,000
200,000 letters at 2 *s.* 6 *d.* each	25,000
Receipts to Bombay	55,000
Add 30 *l.* profit on the above number of passengers in the maintenance 400 × 30	12,000
Profits between England and Bombay	£*67,000

The number of letters received and dispatched annually to all India, as given in the Madras report to the India Board, are on an average of five years as follows:

	Received.	Dispatched.
Calcutta	98,189	72,397
Madras	31,306	40,614
Bombay	30,000	24,000
Ceylon	6,000	6,505
	165,495	143,516
		165,495
Together		309,011

Estimate their receipts 74,500 *l* to Bombay. Their rate of postage differed from the above, which is considered as now determined on by His Majesty's Government as postages for letters between England and Bombay.

ESTIMATE of Expense of Communication between *Suez* and *Bombay*.
Outlay for one Steamer :

		£
Hull, &c.	14,000	25,000
Machinery	11,000	

Annual Expenditure.

	£
Sinking fund to perpetuate property, repairs and insurance, 16 per cent.	4,000
Interest four per cent.	1,000
Establishment and victualling	2,642
	7,642

Coals at Suez, 60 *s.*
Camaran, 60 *s.* average.
Socotra 50 *s.* ; 52 *s.* 6 d. per ton.
Bombay, 40 *s.*

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* The London Association.

Say 14,000 miles steaming for such vessel in a year, at 200 miles a day, with 18 or 19 tons of coal per diem, making 70 days' consumption, at 52 *s.* 6 *d.* per ton....	3,400
	£ 11,042

Five vessels would cost 55,000 *l.* a year to maintain the communication between Suez and Bombay. *Floating depôts for coals* between Suez and Bombay, establishment in Egypt, &c., not included.

Falmouth and *Alexandria.*

Outlay, one Vessel.

		£
Hull, &c.....	14,000	25,000
Machinery, duplicates, &c.....	11,000	

Annual Expense :

*Sinking fund for repairs, and to perpetuate property and insurance, 16 per cent..........	4,000
Interest at four per cent..	1,000
Establishment and victualling	2,642
Say 14,000 miles, or 70 days' work for each vessel, and consuming 18 or 19 tons per day, at 30 *s.* a ton throughout....	1,900
	£. 9,542

Five vessels, at 9,542 *l.* each causing an annual expenditure of 47,710 *l.* for this portion of the work; establishment, warehouses, &c. not included

ESTIMATE of Expense between *Socotra* and *Calcutta.*

Outlay for one Steamer, 600 to 700 Tons, 180-horse Engines.

Hull, &c.	14,000	£ 25,000
Machinery and duplicates, ...	11,000	

Annual Expenditure.

*Sinking fund for perpetuating property, repairs and insurance, 16 per cent. .. .	4,000
Interest on outlay, four per cent.	1,000
Establishment and victualling	2,642
†14,200 miles steaming a year each vessel, at 200 miles a day, would require 71 days' coal, at 18 or 19 tons per diem.	
‡One quarter the supply would be from Socotra, say at 50 *s.*; one half from Galle, at 30 *s.*; one quarter Calcutta, at 30 *s.*; making 1,330 tons, at 35 *s.* per ton; say	2,300
	£9,942

Five vessels, 50,000 *l.* for the whole duty; and this may be lessened by the vessels remaining in port giving a portion of their crews to others, as they might be fairly employed double the time here named.

COALS required each Year.

	Tons.	Each Voyage between	Tons.
At Suez	1,250	Suez and Camaran	104
Camaran	2,256	Camaran and Socotra	85
Socotra	4,584	Socotra and Bombay	136
Bombay	1,632	Socotra and Galle	160
Galle	3,672	Galle and Calcutta	136
Calcutta	1,740		
TOTAL	15,134	tons a year, of which about 14,000 will go by the Cape of Good Hope.	

SHIPS and TONNAGE to India in One Year (per M'Cullock.)

	Ships.	Tons.
To East India Company's territories and Ceylon..	193	85,260
To China	19	24,648

ESTIMATE of Returns on the combined Plan.

In this case Bombay would be less than original estimate for Bombay only.

	£
Say 250 passengers at 40 *l.*, profit..	10,000
Deck and steerage passengers..	2,000

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* The moderate work requi[illegible] each vessel is to be taken into account.

† I find this distance between Calcutta and Socotra is also estimated at 2,965 miles.

‡ Madras memorial to Court of Directors (March 1836), reports, " From statements of actual transactions, furnished by the mercantile houses here, it appears we are warranted in taking 30 *s.* as a fair price for coal in India at present. The general opinion of merchants [illegible], that it is more likely to fall than to rise, when there is a certain demand.

	£	£
Periodicals, parcels, newspapers, &c..	7,000	
100,000 letters at 2 ***s*. 6** ***d*..**	12,500	
The above 250 passengers in the Mediterranean, at a profit of 30 ***l*. each**	7,500	
		39,000
Returns as per estimate, England with Calcutta, Madras, and Ceylon..		73,600
100,000 letters transferred from the Bombay estimate would here be distributed to those places, average ***3s. 6d.*** **each..**		17,500
		130,100
Expense, between England and all India..		185,000
Deficiency..		£. 54,900

	£.
Estimate of expense between England and Bombay only	136,000
Receipts to Bombay only..	67,000
Deficiency..	£. 69,000

	£.
Deficiency on estimated plan..	54,000
On Bombay plan..	69,000
In favour of extended plan..	£. 15,000

Thomas Turton, Esq., called in ; and further Examined.

1173. Mr. *Mullins*.] MR. PEACOCK stated in his evidence that the charge for freight from Calcutta to Mocha would be 50 rupees per ton ; does your experience enable you to state whether that opinion is correct or not ?—I know it is not correct. We freighted a vessel, as members of the steam committee, when we sent the Forbes from Calcutta to lay in coals both at Socotra and Jiddah; we paid 37 rupees per ton to Jiddah and 35 rupees per ton to Socotra. Mr. Peacock also stated the delay at each place would be five days for coal. We made our arrangements through the native agents, and the agent we sent to Socotra was absent at the time the vessel arrived ; he had gone on to Jiddah ; but notwithstanding his absence, they laid in 40 tons of coal in two days, and I believe it might be done in less. I think the delay at Jiddah was the same, but that I cannot speak to with the same certainty as I can of that at Socotra. I have no doubt Mr. Peacock took his estimate from what he had known to be paid by the Company, and he judged from the freight paid from Bombay ; but last year the Company paid only, from Bombay to Suez, 32 rupees per ton. The fact is, that the season of the year when the pilgrims go to the Hadje, there are a number of vessels going to the Red Sea which are very glad to take freight, and they will take it at a lower rate than I have mentioned, I have no doubt, if proper arrangements are made for that purpose.

1174 Do you wish to state anything further ?—I believe there is nothing further.

[Adjoined to Tuesday next, at Twelve o'clock.

The following Answer to Question 1353 is substituted for the Answer as first delivered, and printed above.

1353. YOU are aware of the opposition created by the south-west monsoon between Bombay and Socotra at certain periods of the year, and you are also aware that that wind blows with very great force ; now looking to that, what sized vessel should you recommend to be put upon that station particularly ? —I recommended to the Provisional Committee of Merchants, on being consulted by them, vessels of 620 tons, builders' measurement, to have a displacement of 720 tons, and an immersed sectional area of 220 square feet when deep. I recommended these vessels to be fitted with engines of 51-inch cylinders, and 4 feet 6 inches stroke, in which lightness and compactness should be combined with solidity, similar to some of those which have been lately furnished to the French government, but with an increase of three inches to the diameter of the cylinder. From such vessels an average hourly speed of eight-and-a-half knots might be safely relied on, and, supposing them to be laden with 200 tons of coal, this quantity would enable them to accomplish a distance of 2,250 miles, or would suffice for a run of 11 days ; for even with the ordinary condenser, their actual hourly consumption would not, with frequent pauses, exceed 15 cwt. These vessels would have accommodation for 60 passengers of all classes, and have stowage for about 20 tons of luggage and parcels, and as the quantity of coal alluded to would be excessive at all times, excepting during the height of the monsoon, a weight in goods equal to that excess might be conveyed, if freights should offer, between the monsoon periods. If, however, the system of condensation by surface, as practised by Mr. Hall, or that of condensing by surface and by reinjection of the condensed water, as practised by Mr. Howard, be adopted, the quantity of coals required to accomplish the greatest distance will be reduced very sensibly, and the capacity for cargo increased, without interference with the above average speed, or otherwise the average speed will be increased by the vessel's being released from so much weight.

I cannot but regard it as of vital importance to adopt this system for the Indian steamers, not only from the foregoing reason, but because of the saving of which it will be productive, in the wear and tear of the engines and boilers. This system has been long tried, and its extended and extending adoption by individuals, who each one in his own case has examined into the results which have followed on its use, will be better testimony in its favour than any opinion which I express; I may, however, be permitted to add, that one of the greatest obstacles to the accomplishment of long distances by steam will be in some measure removed by means of this improvement.

As vessels are now fitted, the capacity of their boilers, whether of iron or copper, to raise steam with any given quantity of fuel, decreases rapidly after the first few days firing; this is in consequence of the deposit which will take place, whatever care may be employed to prevent it. If a vessel with the common condenser be kept many days at sea, her hourly consumption, after the first few days, will rapidly increase, until at last it will be as great in attaining a low rate of velocity for her, as in those first days sufficed to procure her highest average; but, as by the new system, the boilers never become foul, the consumption of fuel will, at the close of a long voyage, bear the same proportion to the velocity obtained for the vessel as at first: larger vessels, and provided with greater power than those which I conceive to be sufficient to meet the present wants, would, no doubt, give a better performance, but not in the ratio of their first cost, nor in that of the expense of working them, and if there be no necessity for accommodation beyond 60 passengers, the very great difficulty that attends the manipulation of the larger engines when they require repairs, and the greater time required for these repairs, form an objection to the employment of them in the India Ocean.

Assuming it to be admitted that vessels of the class which I recommend offer sufficient accommodation, and that by attaining the average velocity which I assign to them, with the capacity for 11 days firing at full pressure, they are equal to the proposed duty, I submit the following table of comparison of the performance to be expected from them, with the ascertained performance of other sea-going vessels of admitted excellence; and by sea-going vessels, I mean those that cross the bay and the ocean, in contradistinction to the coasting steamers, whose averages form no exact criterion. I may here cursorily remark, that the smallest vessel named in the table, the Transit, has made her passages to and from Malaga, throughout the past year, and up to the present time, with the greatest regularity, and without having been surpassed by any of her competitors, either in respect of speed, behaviour as a sea-boat, or hourly consumption of fuel per horse-power; thus affording an inference that if the velocity of the new large boats has proved greater than that of the vessels which they were built to supersede, it may be in great part attributed to the improvements which ingenuity has been continually making in the forms of vessels, and in the performance of the machinery. The increased velocity ought not, therefore, to be altogether attributed to the increase of size and power. I may further add, that this little vessel being in the Tagus in the spring of 1836, weighed for England in company with a larger and more powerful boat; the larger vessel having been unable to cross the bar owing to the heavy sea running, the Transit also anchored, but afterwards weighed and stood for the bar, followed by her rival; the Transit made good her offing, and reached Falmouth on the very day on which her rival succeeded in quitting the Tagus, thus showing the capabilities of a well-proportioned steamer, even when of small tonnage and power.

In the case of the two French government vessels, the Leonidas and the Tancrede, I have seen official letters, stating them to have attained as high a velocity, for lengthened periods, as 10½ knots, even in bad weather; and a communication was made to me by the Chevalier Colonel Lampo, the chief of the état major of the Sardinian marine from Genoa, by which it appears that the Gulnare usually reached a velocity of 10 knots and 10½ knots per hour when the sea was not very rough. This vessel keeps up the communication between Sardinia and Genoa, and in her run from Blackwall to Genoa touching at Falmouth; Lisbon, and Gibraltar, she averaged a speed of nearly 10 knots by course, as I was informed by the late Chevalier Grosson, the chief of the Navy Board at Turin, who took his passage in the vessel: the weather was represented as having been variable.

[For Table above referred to, see Appendix.]

Martis, 4th die Junii, 1837.

MEMBERS PRESENT.

Mr. Bagshaw.
Lord William Bentinck.
Mr. Crawford.
Mr. R. Gordon.
Mr. Mullins.

LORD WILLIAM BENTINCK, in the Chair.

Major Charles Head, called in; and further Examined.

1175. *Chairman.*] Is there any part of your evidence that you wish to explain?—Yes; a part of my evidence that I am anxious to explain is in reference to a question that was asked me on Friday last. I stated on behalf of the London Committee that there was no further proposal to lay before this Committee, this however was said under a supposition that a proposal sent into His Majesty's Government, dated 24th May last, was before this committee, finding that it has not been given in I now feel it my duty on behalf of the London Committee formed for the promotion of steam navigation with India, to lay the same before the Committee and request it may be placed on record. This is the plan, and a letter which accompanied it to Sir John Hobhouse.

[The same were handed in and read, copies of which are as follow:]

Plan for a comprehensive steam communication with India, and the mode in which it is to be effected: Packets to depart from England and the three Indian presidencies respectively, once in every month, to be regulated as to the time of their departure, so as to ensure the effectual working of the plan throughout. The packets to be independent of the Government Malta mail-packets, and the voyage to be a continuous one throughout. The packets to be adapted as well to the conveyance of samples, parcels, and packages, as to accommodate at least 60 passengers, to be subject to Government inspection whenever deemed necessary. That the company place a requisite number of vessels between England and Alexandria, also between Suez and Socotra, and between Socotra and Bombay, Ceylon, Madras, and Calcutta; these vessels to enjoy all the immunities from duties, port charges, &c., similar to His Majesty's packets, whether at home or in the European or Indian Seas. The special protection of Government to be afforded to the company's agents and servants in Egypt. The Government to grant to the company the sum of 125,000 *l.* annually for ten consecutive years, by monthly allowance, subject however to the following condition, viz.

		£.
Sum required		125,000
Postages are estimated at	£. 75,000	
Conveyance of Government and East India Company's despatches	20,000	
		95,000
	£.	30,000

Therefore, 30,000 *l.* will be the positive annual cost to the Government and the East India Company for establishing a communication fraught with such political, commercial, and moral advantages to the two countries. That, if the company shall realize profits exceeding 10 per cent on their capital paid up, the excess of such profit to be abated from the Government contribution; it being understood that 5 per cent. for interest, and 5 per cent. on the investment for premium of insurance during peace, with a proportionate increase for war, and 5 per cent. for the formation of a fund to replace the property, shall be considered as charges on the capital before profit is estimated. The company's packets to convey the Home and Indian Government dispatches, and the several Indian mails between England and India, free of any other charge to Government, the postages on both sides remaining altogether with Government. An extra Mediterranean mail to be conveyed for Government free also from charge.

No. 6, Crosby-square, 27 May, 1837.

Sir,

I HAD the honour, in the month of November last, to forward you, through William Hutt, Esq., M. P., a report of the committee for promoting steam navigation with India, in which it was proposed to establish a monthly steam communication with Bombay *via* the Red Sea, with the view of extending the same at a future period and certain services were thereby offered to be performed for His Majesty's Government and the East India Company, in consideration of the amount of 65,000 *l.* being paid annually. The provisional committee have not ceased to devote unremitting attention to this important subject; and I have been requested by the committee respectfully to inform you, that further experience and the benefit of their communications with India fully show the necessity of the measure being extended to the various presidencies at once; and with this view they have desired me to submit to you, and to request you will be pleased to lay the same before His Majesty's Government, a renewed proposal for the establishment of steam communication with India on a comprehensive plan, suited to meet the great and important interests of all classes deeply involved in the success of this undertaking.

I have the honour to be, Sir, your most obedient servant

Charles F. Head, Chairman.

To the Right Hon. Sir John C. Hobhouse.
President of the India Board.

1176. Mr. *Bagshaw.*] You have had the advantage of reading the papers that were placed on record, the proceedings by the President of the Board of Control, and particularly a letter from the secretary to the Post-office to the Post-master-general; will you state to the Committee in what way you considered that letter and its statements to be incorrect?—The letter to the Earl of Lichfield, the Postmaster-general, had reference to the present state of communication *via* the Cape of Good Hope. Upon that communition, on which 2 *d.* and 4 *d.* is charged for letters, an estimate was made of the present expense arising to Government and to the public from postage between England and India; that, of course, amounted to a very small sum, and therefore it was said, as a reason for declining the offer of the London Association to establish communication with India, that the public would require to make up a very large sum of money, as much as 400 or 500 per cent. upon their present postage between England and India. In the statement alluded to, no credit was given for passengers, for parcels, for specie or for other sources of profit which the London Association had very largely calculated upon, and which would lessen any charge for postage. Also in reference to the Mediterranean packets, the present postage to the Mediterranean was all that was calculated on the Government account, and that sum, amounting to about 13,000 *l* a year for Indian and Mediterranean postage, was taken as what the Government would receive in lieu of 45,000 *l.* a year asked of them by the association for establishing a communication monthly with India; likewise the Mediterranean packets which would be superseded by such an arrangement, would give the Government a saving of probably 30,000 *l.* at least per annum, which ought to be taken into account in the statement alluded to.

1177. Is there anything more that you wish to speak to; what is the difference as to the proposal that you have now given in and the proposal of the London committee as already on record?—The proposal of the London committee that was first submitted to His Majesty's Government was merely in reference to an extended communication with all India, but was made only upon a limited communication with the port of Bombay, as being the nearest place to arrive at, and consequently admitting of less complicated estimates and arrangements; but it was given in with an understanding that, as soon as the principle of steam communication with India should be obtained, the communication was to be extended by the London Association to all India; and for that purpose, a gentleman in the city, who is a commissioner appointed in India to attend to this subject, did not join the provisional committee in London, with an understanding that as soon as such principle was obtained (of steam communication with India), he was to put himself in communication with the London committee to obtain the extended arrangement. For that purpose also the capital of the London Association was placed at 500,000*l.* to admit of communication with all the presidencies of India, instead of 250,000*l*, which would be quite sufficient to establish a monthly communication with Bombay alone.

1178. What reason have you for supposing the extended plan ought to be the one begun with?—The extended plan can be done at a considerable saving of expense in the first instance, as the benefits obtained by it will be very large in proportion to the additional expense over a limited communication to any one port in India. The great expense of communication is from England or between England and the entrance to the Red Sea. The comparative expense of extending it from that point to the different presidencies of India is as one to three in proportion to the first outlay, whereas the benefits are proportionately great.

1179. I presume there is no more difficulty in the one plan than the other?—The plans are equally practicable, and the expense that would be incurred by the greater is less in proportion to the receipts; whereas any miscarriage in the confined plan having limited benefits and dividing the interests concerned in this undertaking, would have much more danger of total failure, and this is the only thing now to be guarded against.

Lieutenant-Colonel *Pim*, called in; and Examined.

1180. *Chairman.*] YOU are a Lieutenant-colonel in the Madras Engineers?—I am.

1181. I believe you were ordered by the Madras government to survey the Straits of Manay, were you not?—Yes, in 1829.

1182. Would you have the goodness to state to the Committee what those orders were?—Those orders were to inspect the passage between the island of Ramisseram and the coast of Coromandel, and to ascertain the practicability of the passage being improved and deepened, so as to admit of vessels passing through it.

1183. Would you state the substance of your report?—That it was practicable.

1184. Be so good as to describe the passage of Pambam as you found it, between the island of Ramisseram and the coast of Coromandel?—That was found to be about six feet deep at high water, and about four feet at low water, the rise and fall of the tide being from two feet to two feet six inches.

1185. What was the extent of that passage?—The space between the island of Ramisseram and the coast of Coromandel is about two and a quarter miles, and is connected by a ridge of rocks about 140 yards in width, through which there is a narrow channel, as above described, containing six feet of water at high water and four feet at low. After minutely surveying and examining the passage, it was considered practicable to obtain a passage of about 12 feet of water at high water, but that the expense would be very considerable. A copy of the map and report was transmitted to the Geographical Society in London, which, if required by the Committee, I think I can obtain for their information.

1186. What was the nature of the rocks?—Sandy rocks; a rock of sand, of no great depth, and very easily removed; but that is not the chief difficulty; the chief difficulty is a sand bank which lays a little to the south of these rocks, and upon which there is not more than seven feet of water at high water. It is the removal of this sand bank, or deepening the channel across it, which was considered the principal difficulty. One of the proposed plans of obtaining a passage through the straits was by cutting a new channel to the west of the present one, by means of which the sand bank would be entirely avoided.

1187. You state 12 feet as the depth to which you could deepen the rocks?—Yes.

1188. How would you do that?—By blasting the rock, and removing it; one attempt was made, and succeeded, as far as it was attempted.

1189. Do you think it could be deepened more, if necessary?—I think not above 12 or 14 feet at the utmost.

1190. What do you conceive to be the cause of the formation of that sand bank?—It appears that the island of Ramisseram and Coromandel were originally connected, and that the sand bank was formed from the debris and materials of the chain of rocks connecting the main land and the island of Ramisseram when it was broken up and destroyed by some hurricane.

1191. Is there any current in the Pambam passage?—There is

1192. Do you know whether the state of the sand bank is altered, whether it undergoes any change?—It undergoes a change every year during the monsoon; and during the north-east monsoon the weather side of the bank is perfectly free from sand banks, and there is a depth of water, for a distance of a mile and a half on each side of the bank, of four or five fathoms. There are three principal channels across it, and along side of these channels there are sand banks, which are always formed as the monsoon changes, and so completely obstructs the passage across them.

1193. Mr. *Mullins.*] The passages themselves are constant, they do not seem to vary?—The three principal passages do not; they seem always to continue the same; there are three of them.

1194. *Chairman.*] What depth of water did you say there was?—The bank itself is generally about four or five feet above water, but there are many parts for some space, at times for two or three miles, which are covered with two or three feet of water.

1195. What is the breadth?—Not above a quarter of a mile, and at the distance of a mile and a half from it on both sides the depth of water is from three to four fathoms, It is a singular formation; there seems to be no reason for it whatever; the sea is perfectly clear on both sides for a great distance.

1196. And you are quite satisfied it is composed entirely of sand?—It was bored down to the depth of 30 feet, and there was sand to the depth of 30 feet, and not the slightest appearance of rock. That formation of rock again, which connects Ramisseram and the coast of Coromandel, runs in a different direction, and passes quite clear of a bank called Adam's Bridge.

1197. Has it ever been attempted to make a passage?—No; no attempt has ever been made.

1198. What do you think would be the effect of making a passage?—It would be the greatest possible benefit.

1199. But do you think it would be practicable to make a passage across?—Yes, at an enormous expense; at a very great expense.

1200. Over the sand bank?—Yes; that is the only place where deep water could be obtained sufficient for large vessels. When I was sent down to survey this, there was no question then about steam communication; it was entirely for the purpose of obtaining a passage for sailing vessels, to prevent the delay and difficulty of passing round Ceylon during the monsoons. The only place where a passage of that description could be obtained is across Adam's Bridge, but the expense would be far beyond any benefit that could be derived from it.

1201. Mr. *Mullins.*] And you do not suppose it could ever be a safe passage in consequence of shifting sands on either side?—Except by means of bulwarks carried into deep water to prevent them.

1202 Which would lead to an enormous outlay?—Yes.

1203. *Chairman.*] But if you could deepen the passage, there would be no sand banks?—No, not if you could deepen it, and keep it deep.

1204. But would there not be a constant current through?—Yes.

1205. You think that would not keep the passage open?—Not unless there were bulwarks carried into deep water beyond the breaking of the surf; there is a heavy surf, especially during the south-west monsoon, which would throw up the sand, and prevent its ever remaining open, unless there were bulwarks carried into deep water, and beyond the influence of the surf.

1206. Mr. *Mullins.*] And you do not apprehend it is possible to cut through the rock, to a greater depth than 12 or 14 feet, between the island of Ramisseram and the main land?—The rock itself is not more than two or three feet deep; you then come to a sandy bottom. It is the original rock which has risen, the formation of which can still be traced on the two opposite coasts, and which has been broken by some hurricane, and is fallen down into the bottom of the channel, on the removal of this you would come to a clear sand bed.

1207. Then what difficulty do you apprehend there would be in making the channel deeper?—The channel might be made deeper, but there is the bank beneath it again; there is a difficulty in deepening that. There is no difficulty in deepening the channel itself, and deepening the ground on both sides of it, and deepening the sand bank which lays to the south of it, and which is formed by the debris, or the materials of a place which originally connected Ramisseram and the main land. One plan propossed was to cut a new channel through this tongue of land, so as to keep clear of the sand bank altogether.

1208. What is the breadth of that tongue of land you mention?—About a quarter of a mile.

1209. And is it low?—Yes; five or six feet above high water.

1210. What is your opinion of such a project?—It might be done at a moderate expense.

1211. And is there deep water on either side of that tongue of land?—Yes, a depth of 12 feet; not above that.

1212. *Chairman.*] Do you think you could keep that channel open?—To the depth of 12 feet.

1213. You think you could?—Yes.

1214. Is there any surf sets on this?—Very little surf; not much surf. It is a hard bottom to the north-east, and to the south-west it is protected by islands.

1515. Do you consider that the best mode of accomplishing a passage?—I think it is the only one; the best one certainly.

1216. Mr. *Mullins.*] Do not you apprehend it is possible to deepen the passage more than 12 feet?—I do not think it is possible; it would be very impolitic to trust to its being deepened beyond that; it might be possible.

1217. *Chairman.*] What is the depth of water on each side of that tongue of land?—After a distance of 800 yards there is from 8 feet to 14, and after that it deepens rapidly on the north side; and at the distance of about 200 or 250 yards to the south side there are 12 and 14 feet water, and it deepens again rapidly after that.

1218. But it never can be made a passage for steamers drawing 15 and 16 feet of water?—No, I think not.

1219. It has been stated there is a passage between the island of Monay and the main land of Ceylon; what is the depth of that?—Not more than three or four feet; that is quite out of the question; quite impracticable.

1220. Where is that sand bank you stated?—It is 700 or 800 yards to the south of the Pambam.

1221. Is there the same depth of water upon that always?—Always the same; it never varies.

1222. Where is Tootercarron?—If Tootercarron was to be made the starting-place for all steamers, then it is a passage that for steamers drawing from 10 to 12 feet depth of water would be quite sufficient between Bengal and Tootercarron, and between Bombay and Tootercarron.

1223. What sort of harbour is it?—It is very safe; a very good one.

1224. That is quite sufficient at all seasons?—Yes; there is one at Cochin, on the Malabar coast.

1225. It is very difficult to get into Cochin, in the south west monsoon, is it not?—Not with steamers; with sailing vessels it is.

1226. You have surveyed Cochin, have you?—I have not been there.

1227. Have you been at Goa?—No, I have not.

1228. By report, which is the best port of the two?—Goa is the best.

1229. Mr. *Mullins.*] Have you formed any opinion or estimate as to the expense of making the passage between Ramisseram and the main land?—From 10,000 *l.* to 12,000 *l.*, or 15,000 *l.*

1230. You think that would do it in the most effective way practicable?—Yes, I think so.

1231. Mr. *Crawford.*]—At the gulf of Monay?—Yes.

1232. *Chairman.*] Would not the deepening of that passage be a great benefit to the native vessels between the two coasts?—Yes, great benefit.

1233. Has any improvement been made in that passage? The passage was straightened and slightly deepened, and native vessels now pass through with much more facility, and drawing rather more more than formerly.

1234. How much did you deepen it?—A few inches only.

1235. Mr. *Crawford.*] How was it straightened?—By the removal of the intervening rock.

1236. Blasting it?—Yes, blasting it.

1237. *Chairman.*] Have you reason to know what the feeling of the inhabitants of Madras are respecting this communication?—They are very much in favour of it; very anxious to take advantage of it; *but they are obstructed greatly by the difficulty and expense of finding* a way to Bombay, which restricts *the advantage at present to single men; but there are some cases where ladies have* also taken *advantage of that route.*

1238 If the communication was perfectly established, do you think that the greater part of the civil and military officers would take advantage of it?—Almost the whole of them would, married and single both; there is a very great desire indeed for it.

James Cosmo Melvill, Esq., called in; and Examined.

1239. Mr. *Gordon.*] ARE you aware of the depth of water in the inner harbour of Mocha?— I have understood there is not sufficient depth of water for steamers of the burthen of the Atalanta and the Berenice when fully laden.

1240 Do you consider that that deficiency of water in the inner harbour of Mocha will in any way interfere with the arrangement you have made for the steam navigation between Bombay and Suez?—I do not. Sir Charles Malcolm has stated that whatever difficulties three may be with respect to the anchorage at Mocha, he is satisfied that they may be overcome. It has been suggested that there should be a floating depôt in the outer harbour; doubts have been entertained whether that would be practiable; if it should be found impracticable, he is then of opinion that Perim may be substituted for Mocha. He is also of opinion that coal might be transported from Mocha to Aden that Aden might be made the station.

1241. Are you of opinion that if letters are put into the English post-office in India, in expectation of a monthly communication being immediately established, that persons relying upon that conveyance will be disappointed?—I am not; there may be some disappointment in the early periods, until a greater strength is placed upon the establishment, but the Bombay government have been authorized temporarily to supply the deficiency by the use of sailing vessels; and I think in that mode the disappointment contemplated may be in a great degree averted.

1242. Are you of opinion that during the prevalence of certain winds (the monsoons) it will be useless to expect a regular monthly communication between Bombay and the Red Sea?—I am not of that opinion; but of course as to the effect of the monsoon in the Indian seas on steam navigation, that is a practical question which I cannot be presumed to be conversant with.

1243. Are you of opinion, that under the present arrangements, probability is, that instead of a monthly communication, it will be a two monthly communication for the next two years to come?—That is not my opinion; I am convinced that the Indian government will use every effort to accomplish the arrangement to the extent contemplated in the court's order.

1244. Is it your opinion that sufficient power has been given to the Indian government, and sufficient means placed at their disposal, for the purpose of effecting that which your instructions contemplate, namely, a monthly communication between India and Europe?—I think they will not have sufficient means to insure it until a further supply of steam vessels is sent out; but the probability is, that the object will be in a considerable degree attained by the use of sailing vessels to supply the existing deficiency.

1245. What steps have been taken for the purpose of placing any new steam boats there?—Not any at present; that subject is under consideration at the India House.

1246. Is your opinion in favour of passing the public despatches through France to Marseilles, and embark them at Marseilles on board the steam-boats, instead of sending them all the way from England by the Malta packets?—The communication will be greatly accelerated by the use of the route by way of Marseilles.

1247. Is it your opinion that this steam communication will be the means of conveying passengers as well as letters, and that passengers will avail themselves of that opportunity?—No doubt.

1248. Do you apprehend that the bringing of passengers will not only be a convenience to the inhabitants of India, but also a source of profit to the Company?—I think it might be so made.

1249. You think it might be made to combine both elements; both convenience to the parties and profit to the company?—I think an arrangement might be made by which a profit would result from the conveyance of passengers.

1250. Mr. *Crawford.*] In the shape of passage-money, for the accommodation of the vessel?—Clearly; I rather think that that arrangement with respect to the Hugh Lindsay latterly has been that a certain sum has been charged for the passage money, of which the captain takes a portion, he paying the supply of the table.

1251. Mr. *Mullins.*] Do you know what proportion that is?—I am not aware of it at the present moment: I could obtain it for the committee.

1252. Mr. *Gordon*] Are you aware of the communication that has taken place with the Court of Directors on the subject of the tripartite communication with the Red Sea, I mean to Madras, to Bombay and to Calcutta, in preference to confining the arrangements entirely to Bombay; are you aware of that communication?—I am.

1253. Are you aware of the arguments that have been adduced in favour of and against that scheme?—I I believe that Sir John Hobhouse, in his letters to the chairman, expressed an opinion that no scheme would be satisfactory that did not embrace the whole of India.

1254. But was that scheme to embrace the whole of India by means of inland communication from Bombay, or was it a steam communication?—I looked upon it to be steam.

1255. Can you state to the Committee, in substance, arguments that have been adduced to the East India Company in opposition to that scheme?—I believe that the general argument has been, that having ascertained by experience that the route from Suez to Bombay was practicable, and not having any such experience for their guide with the other parts of India, that it has been thought most desirable to limit the establishment at first to a communication between Suez and Bombay.

1256. Has not the point of expense also weighed considerably with the Court of Directors, in limiting their arrangements, in the first instance, to a single communication, indeed of a tripartite communication?—I do not think that the Court of Directors have yet sufficiently adverted to the plan of a communication with all India to have made the expense a matter of calculation; they would undoubtedly do so as soon as the proposition assumed a definite shape.

1257. Are you not aware that the discussions which have taken place between the King's Government and the Court of Directors of the East India Company, has, as it were, ended in this arrangement, to effect which considerable difficulty has been encountered?—Certainly.

1258. Are you not also aware, that if the King's Government or the Board of Control had pressed too strongly on the Court of Directors a more extended scheme in the first instance, that there might have been a considerable probability that no arrangement whatever would have taken place?—I think it would have greatly increased the difficulty.

1259. *Chairman.*] What establishment of steamers do you consider to be necessary to carry the communication on to Bombay?—I think four absolutely necessary, and that it will be desirable to have a fifth.

1260. And to Calcutta?—I have not made any calculation for Calcutta, but looking at the distance, I believe Calcutta is as far from Socotra as Bombay is from Suez, therefore, looking to the distance, it would seem to require an establishment as large.

1261. Mr. *Mullins.*] That is, you mean four additional?—Yes, four additional; supposing Socotra was made a station from Bombay, and that you had a communication from Socotra to Calcutta, I should imagine you would require for that communication as many vessels as you would require for the communication from Suez to Bombay.

1262. As many more?—As many more.

1263. *Chairman.*] In the year 1834 there was a doubt of the practicability of steaming against the south-west monsoon from Bombay?—There was.

1264. Is that doubt removed?—It is in a great measure removed, but still it appears to be matter of opinion and of doubt in some persons' minds.

1265. Have you any doubt upon the subject?—Really I have no means of forming an opinion that would be of any use or satisfactory to the Committee.

1266. Mr. *Crawford.*] Are you aware a Malta steamer, two years ago, was forced back to Falmouth after having sailed?—Yes, she was.

1267. Mr. *Mullins.*] What was the power of that steamer?—I forget her power.

1268. *Chairman.*] Are you acquainted with the estimate of expense of this communication with Bombay, of the four or five vessels?—I am.

1269. Is it the same as Mr. Peacock stated?—The estimate is contained in the statement of Sir John Hobhouse, page 6.

1270. Then the expense would be 22,000*l.* a year for each?—For each.

1271. That estimate you consider to be correct?—I have every reason to believe it is a correct estimate.

1272. Because from other statements there is reason to believe the coals will not cost so much money as that?—We endeavoured to make it a safe estimate; we require experience to enable us to ascertain the precise cost of coals, and the Court of Directors are now endeavouring to ascertain by experiment what is the cost of placing coals at the several depôts.

1273. Has any allowance been made in the calculation of the cost of fuel that the vessel on its voyage will sail the greater part of the way, having the monsoon perfectly fair?—Your lordship will see we take 40 days: we suppose each voyage will occupy 40 days in steaming.

1274. Surely that is very much over-estimated?—The estimate in that respect was formed with reference to the actual practice of the Hugh Lindsay.

1275. We have gone in all our calculations upon the performance of the Atalanta and the Berenice?—They are much finer vessels.

1276. Much faster?—Much faster.

1277. Have you made any estimate of the length of passage from Bombay to Suez and back in the two monsoons, either the Atalanta or Berenice?—I have not.

1278 Could you give such a statement; you have got the logs at the India House, I suppose?—I apprehend there will be no difficulty in preparing such a statement.

1279. It was stated here, I think, in the course of the evidence, that Colonel Campbell had written to the India House, making some proposals respecting the use of coals, at a much less price than that; do you know of any such communication?—I have seen a communication from Colonel Campbell; I am not certain whether it was directed to the Court of Directors from the Bombay government, but I am certain I have seen a communication in which he earnestly recommended the plan of sending coals to the Red Sea by way of Alexandria; and the Court of Directors have recently come to the determination to make an experiment of that kind.

1280. Have you made any calculation of the probable returns from each voyage between Bombay and Suez?—I have not. Returns from passengers?

1281. I mean of receipts?—I have not.

1282. What is the number of passengers that the Atalanta and the Berenice carried?—It is stated, in Mr. Peacock's evidence, 36, I think.

1283. Then you probably have not made any calculation of the number of passengers that would go between Calcutta, Madras, and Suez?—I have not.

1284. Without forming any calculation of the number of passengers and freight that would pass between Calcutta, Madras, Ceylon, and Suez, you could not state the probable profits that would be derived from that extended communication?—Certainly not.

1285. And without information upon that point, you could not say that the extra expence would not be repaid by those profits ?—I could not exactly say so, but it would be a large assumption that the returns would be adequate to the whole expense, which is involved in that proposition.

1286. The whole of the extra expense ?—The whole of the extra expense.

1287. Mr. *Crawford.*) Hypothetically we will suppose that two steamers more are necessary to carry on the communication with Bengal than would be required to carry on the communication with Bombay, and that they cost each 22,000*l.* per annum, it will follow that the additional earnings upon the Bengal route must amount to 41,000*l.* a year in order to make that a preferable route with reference to expense ?—Clearly.

1288. Mr. Mullins.] Do you think it would be a point of importance that steamers, in a general communication with the different presidencies, should carry a cargo, to a certain extent, as well as passengers ?—Certainly, cargo would be remunerative.

1289. Independent of the luggage which the passengers, would take with them ?—Possengers, I apprehend, would be more profitable than cargo; but if the steamer could convey cargo as well as passengers, it would be desirable that she should do so.

1290. Assuming that a large steamer, of the size of the Atalanta or the Berenice, or even larger, could afford to take 100 or 150 tons of a general cargo, should you suppose that such a cargo would make a larger return ?—I have made no calculation upon that point, and I am not sufficiently conversant with the rate of freight between India and the Red Sea to enable me to do so; all those elements would be necessary to make the calculation.

1291. Mr. *Crawford.*] At present, do you know of any articles conveyed to India from Suez ?—I do not.

1292. Mocha is the port of export for the produce of Arabia gums and coffee, is it not ?—It is.

1293. Then, if a steamer were to carry the goods that are the present objects of trade from the Arabian Gulf, she must either call at that port, or the goods must be brought to the port of her departure ?—I should think so.

1294. Then, with reference to the question of the conveyance of goods, it must be considered applicable to a description of trade that does not at present exist ?—Clearly, as respects Suez.

1295. But respecting which this facility might occasion to grow up ?—Yes, as respects Suez.

1296. *Chairman.*] Do you mean to say there is no trade between the Red Sea and India ?—Certainly not; I never meant to say that I understood the question to apply to a communication between Calcutta and Suez, without stopping at the intermediate ports in the Red Sea.

1297. Mr. *Crawford.*] Do you think that circumstance of the necessity of trans-shipping that cargo at another port, for instance, cargo laden at Mocha transshipped to another steamer at Galle, would be any objection in a mercantile point of view ?—No doubt about it.

1298. *Chairman.*] What would be the objection ?—Why, there would be risk; there might be legal liabilities.

1299. In what way would there be risk and legal liabilities ?—I do not know how the underwriters would settle their risks in those cases.

1300. Mr. *Crawford.*] Do you know how you could discharge one bill of lading and give effect to another ?—No, I do not.

1301. *Chairman.*] But do you think the knowledge of such transshipment at the port where the insurance is made would not be covered by some arrangement or other; it would be taken into the account of risk, I presume ?—I have no doubt that whatever difficulties arise in a necessary case, they are met by the enterprise and the skill of our merchants.

1302. Mr. *Mullins.*] You do not apprehend in this case any difficulty which could not be surmounted, seeing the great advantage of conveying goods of a certain description in as quick a time to the Arabian markets ?—I have no doubt, if a merchant felt it necessary to avail himself of that mode of sending goods, that any difficulty that might arise would be overcome.

1303. *Chairman.*] Do you know the present establishment of vessels in the Indian navy ?—I forget at the present moment; I think it is 11 or 12.

1304. Actually employed ?—Actually employed.

1305. Do you know about what the annual expense of them may be ?—My impression is, about 100,000 *l.* a year.

1306. Do you know generally how they are employed ?—Their principal service has been checking the pirates in the Arabian Sea and in the Persian Gulph.

1307. Mr. *Crawford.*] Have not generally one or two of the best vessels been employed in the surveys of the eastern seas ?—They have.

1308. *Chairman.*] Would not that service against the pirates be better executed by steamers ?—An opinion to that effect has been expressed by the government of Bombay.

1309. Do you think that a steam establishment of that sort might not perform that service and convey the Bombay mails to and from Socotra ?—It strikes me that your establishment should be distinct for the conveyance of the mails.

1310. Are there any pirates in the Arabian Sea. ?—I have not heard of any lately.

1311. I believe they are confined to the Persian Gulf exclusively ?—To that side of India.

1312. How many sea-going steamers are there in Bengal ?—There are three.

1313. For what purpose are they employed ?—They are employed in communication with the eastern islands in a great measure; they are for the general service of the Indian goverment.

1314. They are inefficient steamers, I fancy, are they not ?—They are not efficient steamers.

1315. Could they not be more advantageously employed in this communication ?—I really cannot say; the government of India are exceedingly anxious rather to increase than diminish the number of steamers in Bengal.

1316. Do you know for what purpose ?—I do not.

1317. Mr. *Mullins.*] Assuming that there was a restricted communication with Bombay alone, do you suppose that any passengers, not destined for Bombay, would be likely to avail themselves of that mode of conveyance?—Yes, I think they would; I can state to the Committee as a fact, that Dr. Brice, from Calcutta, lately availed himself of that route to come to England from Bombay; and I know of some officers who have availed themselves of it to return to India.

1318. Not accompanied by their families, but merely themselves?—No, alone.

1319. Can you form any opinion as to whether it would be safe for women or children to pass across the country between Calcutta and Bombay?—I never understood there was any difficulty.

1320. Do you think it would be advisable for them to venture?—I have no experience to guide me.

1321. Mr. *Crawford.*] Would you not rather think it a matter of expense than of convenience?—I should think so, than of safety.

1322. Mr. *Mullins.*] Are you aware there are certain periods of the year when the passage is extremely difficult; periods of rain for instance?—No doubt.

1323. Have you ever heard of any accidents occurring to the mails carried by Dawk to either of the presidencies?—There no doubt have been occasionally impediments, but I cannot call to mind at this moment the occurrence of any particular accident.

1324. But is that the general opinion, that there are impediments occasionally occurring?—Occasional impediments, no doubt.

1325. Mr. *Crawford.*] They have not snow there, but rain in torrents?—Yes.

1326. *Chairman.*] Do you contemplate any political advantages from bringing India so much nearer to England, by shortening the communication one-half?—I have no doubt very great advantages, political and commercial, would result to both countries, from the regularity and the facility of communication.

1327. Supposing that the expense was not a consideration, do you not think advantage would be derived if greater facility was given to the intercourse between the two countries by passengers?—I have no doubt.

1328. Can you point out what advantages would be derived from it?—Does your lordship mean political advantages?

1329. Yes, the political advantages?—It strikes me that the home government of India, whether you consider it as an initiating measure to be adopted in India, or as controlling the measures of the local government, must derive vigour and energy in the proportion that the communication between the two countries is accelerated.

1330. And with respect to the facility that would be given to individuals?—I think the residents in a great measure are employed in the Company's service, administering the government of that country, and I think that tends to their comfort and enjoyment will really tend to the efficiency of their service.

1331. Do not you think that the facility that would be given to the civil servants of the Company in coming to England would improve them as public servants?—I think it is very desirable that the European servants of the Indian government should have the opportunity of renewing their English feelings and connexions.

1332. Mr. *Mullins.*] Then it is your opinion that they would all anxiously avail themselves of the means presented to them in place of going to the Cape of Good Hope, which they are in the habit of doing under present circumstances?—The civil servants of India have a temptation at present to go to the Cape of Good Hope, which would not exist coming to England, for they go to the Cape of Good Hope retaining a portion of their allowance, and, what is perhaps of more importance to them, retaining the right to resume office on their return to India, and without prejudice to their time of service.

1333. Do you think it advisable to make such an alteration in those rugalations as would enable them to come to England without detriment to their allowance, having regard to the proportion of allowance which they have on going to the Cape of Good Hope?—I should be very apprehensive of the consequences of any extension of that regulation, which has perhaps been considered prejudicial to the extent to which it is already acted upon at the Cape of Good Hope. I apprehend great injury would result from any extension of that indulgence, which indulgence has been deprecated even as respects the Cape of Good Hope; it leads to the system of acting appointments in India, which is very much to be deprecated.

1334. *Chairman.*] But without holding their situations, and without receiving exactly the same allowances, do you think some arrangement might not be made for allowing them to come to Europe on similar allowances, which would not be very willingly acquiesced in by the servants?—Your lordship is aware at the present moment the servants are allowed to come to Europe on pay for a certain time, a civil servant after 10 years' service.

1335. On furlough, that is; but the question applies to sick leave; they only go to the Cape on sick leave, and it is under those circumstances that they retain the portion, I think three-fourths of their allowance; the question is, whether that would not be more acceptable to them, and more advantageous to the service that they should come to England, the time being the same?—It would be more for the advantage of the service, but whether it would be acceptable to them would depend entirely on the terms that might be proposed.

William Morgan, Esq., called in; and Examined.

1336. Mr. *Mullins.*] WHAT is your occupation?—An engineer.

1337. Have you given your attention to steam navigation with India?—I have.

1338. Is it your opinion that it is practicable at all times of the year?—Of course any opinion which I can give is founded on the opinions and the reports of others in respect of the state of the weather which prevails there; I have never been in India or in the Indian seas, and of course I must depend upon the statements made by nautical men, who were partially also acquainted with steam navigation, and what steam power is capable of doing in those seas.

1339. You are well acquainted, I apprehend, with the nature of steam power, and the different improvements that have been made in steam machinery?—Yes, I am; it has been my exclusive study for many years past.

1340. Then, according to your knowledge, what sized vessels should you recommend for long passages in seas where there is a likelihood of meeting with extremely foul weather?—As a general proposition, and if expense is not at all to be the considered, the larger the vessel the better; a large vessel *overcomes the resistance of the waves, better preserves her way through obstructions, she is better enabled to exert the power within her than a very small vessel is; but the performances of large vessels for long voyages have not greatly exceeded, and in some instances have not at all exceeded the performances* of small vessels.

1341. Then is it your opinion that as far as speed is concerned only, there will be no greater advantage arising from having a larger vessel than having a smaller one?—A very trifling indeed, a very trifling difference in the speed, an advantage unquestionably there would be; the resistance to a vessel of course will depend on the sectional area of the vessel immersed; it will depend also on the weight which has to be driven against the water, or rather on the quantity of water which has to be displaced to admit of her passage, and it will also depend on the dimensions which the better form of the vessel will make in the resistance, and that is generally obtained in greater lengths and in larger vessels.

1342. What sized vessel should you think best adapted for the steam communication from Suez to Bombay, or to Calcutta, or any of the presidencies?—I should consider that a vessel of about 650 tons burthen would be sufficient, and would give as great a chance of certainty as almost any other size.

1343. And what horse power?—Horse power is rather an indefinte term; but, however assuming them to be built on weights which the usual computation is made upon, about 180-horse power, from 170 to 180-horse power, may be placed in a vessel of that size, so as to insure a very good average indeed.

1344. And you think that is a proper proportion of power to tonnage?—Yes, provided the displacement of the vessel is not made greatly to exceed or in short to exceed very much her measured tonnage; a small vessel may be made to measure a great deal and a large vessel may be made to measure a very little, from the improper mode of estimating the sizes of vessels, or of measuring them still in practice; but I am supposing that the displacement of such a vessel would be about 720 or 740 tons, and that her measurement would not be less than 100 tons less than that; I would not have a nominally small vessel carry a very large burthen.

1345. Then, in the opinion you have just given, you take that tonnage as the minimum, but is it your opinion that a larger vessel would be advisable?—Yes, if expense is not objected to, there would be greater accommodation; there would be perhaps some little increase on the average speed, but very trifling, nothing to compensate the expense.

1346. What do you think is the expense of the construction of a vessel of 1,000 tons and 300-horse power in the cheapest mode that it could be accomplished, looking to the obtainment of the most perfect machinery at present in use?—About 35,000*l*.

1347. In what ports would you have those vessels built?—I would prefer building them in London.

1348. Do you not think they could be built more cheaply in the outports?—They might be, but not so well built. In general, they are very shallowly built; there are not such large stocks of timber to be had, workmen are not paid such good wages, and in consequence they do not work with that precision which they do in London. River built vessels are always worth more money built in London than built in the outports.

1349. Then you think that although the expence in a London port may be greater, still that, looking to the durability of the vessel, it is more advisable to go to the extra expense than construct a vessel in the outports?—If I had to build a vessel myself, I should prefer doing it in London, under those circumstances.

1350. And you have stated, I think, that your opinion is, that a vessel properly constructed of that burthen could not be done under 35,000 *l.*?—Not embracing all the improvements and the best machinery: cheap machinery is extremely expensive in the wear.

1351. What boilers should you recommend?—I should recommend iron boilers, because I should recommend condensation by surface; it has now been so long tried by the best experiments, and has certainly succeeded.

1352. Do you think the communication with all the presidencies in India equally practicable as the communication with Bombay?—I should say more so; if there is a difficulty, the difficulty would be in extreme cases, in causing the Bombay boat always to reach Socotra. I do not see any difficulty whatever in making a vessel reach Socotra coming from Ceylon.

1353. You are aware of the opposition created by the south-west monsoon between Bombay and Socotra at certain periods of the year, and you are also aware that that wind blows with very great force; now looking to that, what sized vessel should you recommend to be put upon that station particularly?—I have understood that the force of the monsoon, even at its worst, is scarcely equal to a south-west gale in the Bay of Biscay, or on soundings, and I have also understood that it is not of equal duration: a south-west gale I have known blow almost intermittingly three weeks, and the sea, which is brought in on the edge of soundings, is tremendous, it is terrific. Now I understand that the south-west monsoon only blows occasionally an extreme gale, that it seldom lasts more than 30 hours, and then it lulls and finally subsides altogether. Although the sea never goes down, there have been seasons where in the months of June and July, I think, the weather has had a more determined character, and the monsoon has continued with violence, although not with equal violence to the south-west gales here, still with that degree of violence which would certainly effect the progress of a vessel if she has her head to windward. Under those circumstances, I do not care what power it is that may be put into a vessel, she will not be able to stem the gale; that is, she would be able to stem it probably, but she could not carry a sufficiency of coal to carry her the whole way against it, however large she may be, for the consumption of coal rises very nearly with the power; there is only a very trifling difference in favour of large engines.

1354. *Chairman.*] You stated it was easier to go from Galle to Socotra than from Bombay to Socotra? —From Galle, if that was a good point.

1355. Mr. *Mullins.*] Will you state the reason why it is more practicable to go from Galle to Socotra than from Bombay to Socotra?—In one respect the wind itself is not a head wind for her. The course she has got to steer is off the wind; but by runing a couple of degrees to the southward of that, she gets into a wind which perhaps is a favourable wind, and then makes her westings until the south-west monsoon becomes a fair wind for her, or nearly a fair wind. She would have to lay to north-north-west, then the south-west monsoon would be a fair wind.

1356. *How many tons of coal per horse power do you suppose a vessel of the tonnage you before stated would be capable of carrying?—She would be capable of carrying about one ton and a quarter;* that is, she would be capable of carrying more; but I should not think it necessary or proper for that voyage to put more coal into her, for the vessel may be, and we have had many instances of our Admiralty packets being overladen with coal when they started, and when they got to face the monsoon in their loaded state, they made no progress whatever; if she had less in her she would have done better, the vessel would have been livelier, and the machinary more effective.

1357. But looking to the perfectly effective state of the machinery, you consider a vessel of that size could carry a ton and a quarter?—About that.

1358. And what run will that quantity of coal enable a vessel to effect?—Working at full speed, and going on without any serious obstruction, making the best of her way, it would carry her for about 11 days, I think.

1359. What run for each day?—She would run about eight miles and a half an hour; that is, supposing it to be variable weather.

1360. That is, she would average about 200 miles a day?—Yes.

1361. That would be about 2,200 miles?—It would.

1362. *Chairman.*] Have you seen the Atalanta and Berenice?—Yes, I have seen them both.

1363. Do you consider them well calculated for the service for which they are intended?—The Berenice is certainly a very fine vessel; but I should not have put quite so much power into her, or so much weight into her, and have given her a greater rise in the floor; and I think I should have had at least as much speed out of her.

1364. Mr. *Mullins.*] Are you aware that the French have been making any improvement in the building of new vessels for steam navigation?—They decided on building vessels of about 620 tons measurement, and of putting two engines of 80-horse each into each of the vessels, and they have obtained greater speed than any that we have to offer.

1365. *Chairman.*] Greater speed than the Volcano?—Yes, considerably.

1366. You know that the Volcano has made a very rapid passage lately?—Yes, I am aware of that; but one passage is by no means a criterion of what a vessel can do.

1367. Mr. *Mullins.*] Have you any papers or any authority to go upon?—I have the authority of the French engineers of the commission that is appointed to inspect the vessels, and the particulars of the dimensions of the vessels, and their performances. It appears that two of those vessels had an average speed in the ocean and in the Bay of Biscay of 8 knots and 800$^{\text{dths}}$ per hour, and in the Mediterranean of 8 knots decimal 936. Now, we have no average equal to that anywhere here.

1368. *Chairman.*] And what does that superiority arise from?—Of course within the last few years engines have been improved, and they have studied the form of the vessel; they have paid attention to the minutiæ; they have not overladen the vessel with weights, and they have likewise studied very much the form.

1369. Now, what paddles have they adopted?—They have the common paddle; these vessels have the common paddle.

1370. Mr. *Mullins.*] Are you aware that one of the Mediterranean packets was forced to put back in attempting to make her voyage from Falmouth a few months ago?—It has happened that one of them has done so; I do not recollect the exact period; but that one did not put to sea a few months ago when the mail arrived, I recollect; but it has happened before that such was the case.

1371. Is that a circumstance of frequent occurrence? By no means frequent; I do not believe it has occurred three times, or at the utmost four times, since packets have been established; and the packet service was commenced with vessels built in the very infancy almost of steam navigation, and therefore not upon the most approved principles.

1372. Then you do not consider all the Malta packets to be efficient vessels?—No, not such as would be built if they were now to be laid down; but many of these vessels were built 12 years ago, and in the last 12 years it is that we have learnt something of navigation to distant parts.

1373. But they have got some new packets, have they not?—They have.

1374. Are you acquainted with the rate at which those packets go?—The fastest one averaged 73—4 knots; that is the Ballaser.

1375. You are aware of the distance between Socotra and Bombay?—Yes, it is about 1,200 miles, rather better.

1376. Then if, according to your calculation, a vessel will take fuel without overloading, for 2,200 miles, what impediment or difficulty is there in such a vessel accomplishing the passage by headway, between Bombay and Socotra, or for similar distances?—Because that sufficiency of coal for 2,000 miles was calculated upon the average speed obtained by these French packets, but if the vessel is to be opposed to a continued resistance the whole way, that average speed will wonderfully change; she will have steerage-way, and then that whole quantity in place of being a sufficiency for 2,000 miles, will not be a sufficiency for 1,200; she would not have four knots and a half; for instance, her mesne speed and that quantity of coal would not suffice for 1,000 miles; she would require three miles an hour to steer, and if she has only steerage-way on her that quantity of coal will not carry her a long distance.

1377. Then you think, under any circumstances, it would be advisable for a vessel communicating between Bombay and Socotra to make southings?—Yes, if the weather is dead against her.

1378. I mean in the south-west monsoon?—In the event of a continuous and violent gale against her, then of course her business would be to run to the southward; but if it were only conditional, on the continuance of the weather, then I should say it would be necessary for her to go to the southward.

1379. Do you think it would be advisable that vessels constructed for such voyages should be made effected sailing vessels, as well as steamers?—If you make them what sailors term effective sailing vessels, they are non-effective steamers.

1380. Are you not aware that the Medea was a good sailing vessel?—I am aware the Medea was built as a cruiser to accompany the fleet, and required to be more under sail than under steam; had she been solely built for a steamer, her performance as such would be very much better than it is, because she would be relieved from her top hamper.

1381. Now, according to your calculation, how many vessels do you consider will be required for the entire line between Falmouth and the three presidencies?—There would be 12 vessels required to be in constant motion.

1382. How many between Falmouth and Alexandria?—As an establishment, five.

1383. And from Suez to the different ports of India?—You would require eight, and I should say three spare vessels, because an accident may occur; a vessel may be under repair, and there ought always to be a spare vessel to make certain of it.

1384. How many would you have between Suez and Bombay for a monthly communication?—Five.

1385. Is it your opinion that less than five would answer for keeping up the communication efficiently?—I do not think it would; I am satisfied it could not for long, whatever their power may be.

1386. Will you state your reasons for so thinking?—Engines require frequent repose and frequent cleansing; if any little defect begins to show itself, and it is put off, that defect not only increases in the course of working very rapidly, but it induces others. The distance from Bombay to Suez is very nearly, I think, the same distance as there is between Alexandria and Falmouth, and we have found that the Admiralty have not been able to keep up that communication without having five vessels to do it. There is one vessel constantly between Malta and Alexandria, and there are four vessels that are off and on constantly between Malta and Falmouth; one occasionally under repair; if there are three taking alternate trips, there is one under repair almost constantly; when I say five, I might say six; because, having a number of them, if the Alexandria vessel becomes defective in her machinery, and requires to be sent home, another is taken out to take her place while she is being repaired, so that less than five would not give a certainty. Then the great heat of the climate is likewise to be considered; if you have a few vessels to do the work, the men will be overworked or worked beyond their capability of standing it; the heat of the engine-room is very great indeed, and it relaxes them so completely that they require a great deal of rest before they are enabled to do the work which the engine requires of them; it is not like these cold climates I have known men lifted out of the engine-room, hauled out of the engine-room actually exhausted during the heat there in the Mediterranean or the Adriatic. The heat of the Red Sea is considerably greater than that in any part of the Mediterranean from what I have understood.

1387. And, of course, you think they will require more rest?—They will unquestionably; it is not only the engine which requires rest and cleansing but the men themselves require a great deal of rest.

1388. Then how many vessels would you have between Socotra, taking Socotra as a central point, and the other presidencies?—Four vessels would be enabled to communicate with Calcutta from Socotra.

1389. With Calcutta, Madras and Ceylon?—Yes; but I should prefer allowing them a spare vessel.

1390. Should you think it advisable that all those vessels, I mean on the eastern side of the Mediterranean, should be of one size?—Yes, and the machinery similar; all dublicates. All the wants for the vessels would, under those circumstances, serve almost indifferently the one for the other.—It would be perhaps impracticable to get them all exactly alike, and no two engineers make engines precisely similar; but they ought to be just as nearly alike as possible. It likewise will enable the person who has the establishment in charge to apply the vessels to any particular station, where one may be required, and withdraw any vessel from that station which may require repair. The Red Sea will require less power in itself to overcome its difficulties then the ocean would, but then we are to suppose that there will be a greater number of persons embark on board the Red Sea boats, a greater quantity of parcels and packages, so that that which is not wanted by reason of the obstruction or the violence of the weather, is required by reason of the other wants of that particular station.

1391. Have you made any estimate of the probable expense of a general communication with India?—Yes; I assisted in making part of an estimate for that purpose. Major Head and the gentlemen of the provisional commitee called upon me to furnish them with some particulars, and in so far as the engineering department was concerned, I did furnish them particulars.

1392. Then you have no further information to give upon that point in addition to what has already been given by Major Head?—I presume not.

1393. You furnished him with those particulars, and he has given them in; what distance should you recommend the steamers, of the size you propose, to go without requiring to replenish their coal?—The shortest possible stations for all the steamers. I have known one instance, that is, I have it on report, I was not present, but I have it on such report as I have every reason to place faith in that a vessel starting from Falmouth with the Mediterranean mail has been worked at an hourly expenditure of fuel, in the first instance, of 14 bushels an hour, and before she has reached Gibraltar been consuming 19 bushels. That was from the accumulation of the saturated solution, from the deposit in the boiler, and from the inertness of the men.

1394. *Chairman.*) From the deposit of salt?—From the deposit of salt and from the joints becoming loose, the packing being worn, and the inertness of the men altogether, all causes combining; the shorter the distance that is run the more economical the vessel becomes, the longer she lasts. We have better performances from the same sized vessels. The Dundee and Perth have made very good voyages, running between Dundee and London, for instance; but place those vessels between London and Gibraltar and the average consumption of fuel will increase; it is simply from those causes.

1395. Then your opinion is it would be advisable to have as many depôts as possible in that communication?—Certainly, to have short stages, and to relieve the vessels as frequently as possible, not to make a vessel take the mail at Suez and go on with it to Calcutta, but if possible not to allow one vessel to be at sea continuously for more than five or six days if practicable; but that is not practicable, but at any rate to limit it as much as possible.

1396. Then looking to the expense of the establishment of the various depôts, you consider that that expense would more than be counterbalanced by the longer the vessels would be likely to last?—And the wear and tear will be very sensibly less.

1397. Have you any idea of the annual expense of one of the Mediterranean packets?—None in the world; I have not the slightest idea what the expense is.

1398. How many passengers do you apprehend a vessel of the size you have described (of 650 tons) would be capable of taking, independent of fuel?—About 45 aft-passengers and 25 fore-passengers, between servants and masters about 60 persons.

1399. But how many could such a vessel accommodate with convenience and perfect comfort?—About that number.

1400. You do not mean cabin passengers?—All of them cabin passengers, only some of them fore-cabin passengers and other aft-cabin passengers, between masters and servants; I suppose that some persons carry servants; all persons are counted passengers, although they are in different situations.

1401. Do you suppose that a vessel of such a size would be enabled to carry a general cargo, independent of the passengers' luggage, and also independent of the fuel?—Certainly not; not to maintain anything like a fair average speed.

1402. Then what additional tonnage would you give a vessel, looking to the advantage of receiving a certain tonnage for the conveyance of fuel?—Those vessels would be calculated to carry about 20 tons, because I always understood it was merely parcels and samples and objects of value, which go into a small space, and are not weighty.

1403. Looking to the conveyance of a more general cargo and a heavier one, what sized vessel should you think it advisable to adopt?—Then of course we must increase the size.

1404. Supposing you had a vessel of 1,000 tons, and a proportionate horse power, what tonnage would such a vessel have spared for a cargo, over and above the quantity of fuel necessary?—She would have very little more comparative room, if we were to put power into her in the proportion which the vessel's power bears to the vessel's size.

1405. How many tons do you calculate; you can form an opinion as to that?—To obtain the same average speed that this vessel would, she would not do it; I could not put any more in.

1406. Then I understand you to state you must diminish the vessel's speed if you give her any more room for cargo?—Yes, certainly.

1407. Of course, the witness understands that the question put to him is with reference to the distances those vessels would have to go in communication with India?—I suppose they are to communicate with the several points on which I have been already questioned. And you cannot put weight into vessel without sinking that vessel, suppposing it to be the same vessel; for instance, you cannot put extra weight into that vessel without sinking her more in the water; by immersing her more in the water, the greater duty she has to perform, and with the same power, she cannot perform that duty with equal rapidity.

1408. But considering that a vessel may not have to go at the utmost more than 1,600 miles, do you not suppose that the quantity of fuel might be diminished with safety, so as to admit of greater room for the conveyance of a cargo?—If you diminish, you must replace that weight.

1409. But with safety, looking to the possible obstacles from contrary winds, for instance, that the vessel may meet with?—Not from Bombay, in the monsoon; you might diminish it from Ceylon, but in no great degree during the monsoon: at any other time of the year, in variable weather, then you may diminish the quantity of coal and immerse the vessel equally by a cargo.

1410. Have you turned your attention to any of the late improvement is steam machinery?—Yes, I have.

1411. With a view to the curtailment of space in steam vessels?—I have seen most of the plans which have been brought forward.

1412. Is there any of those plans that you could particularly recommend?—I do not think there is any that has yet had that test of experience which would justify me in recommending it to the Committee.

1413. Have you any acquaintance with Mr. Collyer's boilers?—I have seen them.

1414. Are you aware that a vessel has been fitted with Collyer's boilers, by order of the Lords of the Admiralty?—The Pluto.

1415. It was a tried?—It was tried. I saw the builers when they were fitted, and I saw them after they came out.

1416. Do you know the vessel against which this vessel was tried; the Meteor, I think it was?—The veesels are very dissimilar.

1417. Did you understand how many knots an hour the Meteor made passing down the river?—It is so long since that I carry it in my mind; I cannot recollect that at all.

1418. Are you acquainted with Hill's condensers?—I am.

1419. What is your opinion with regard to their application?—I think it is a most valuable improvement, and one that I almost should say is absolutely necessary to India steam.

1420. Are you aware it has been stated as an objection to them that it renders the machinery much more complicated, more difficult to put in order if once it gets out of repair?—It may have been so stated; I do not see in what respect it injures the rest of the machinery, but they may be applied to engines without altogether preventing the common condenser from being fitted to the vessel, likewise; should anything occur to them, recourse may be had to the common mode of condensation.

1421. Are there any of the Government vessels already fitted with those condensers?—I believe one; the Government did order one set of engines to be fitted with them, but I believe those engines are not yet erected in the vessel; I do not believe the vesel is launched yet.

1422. Have you known any other vessels to which they have been applied, and found to succeed?—The Hercules, belonging to Liverpool, I think, at any rate built at Liverpool, which runs from London *to some port in Ireland now,* and has done for a long time, I think to Cork. I was informed by the *engineer of the Hercules, whom I questioned upon the subject, without his knowing who I was or that I was at all connected with steam machinery; I inquired of him on one occasion when I had known they* had opened their boilers after many months' use of the condensers, and I asked him in what state he found the boilers; he told me they were as clean then (they had been working them for seven months) as they were the day they were put into the vessel; and the same or similar statements have been made by other persons who have had opportunities of inspecting these boilers. There are several other vessels; I do not carry in my mind now the numbers, but they have been now under experiment, if I may so say, for two years; and I do not know any one instance in which they really failed.

1423. Then it is your decided opinion, as a scientific man, that those condensers have been found to answer the purpose in every respect?—I should say, certainly.

1424. And that the experiments have been sufficiently tried to justify you in recommending them to be applied in those new vessels about to be built for steam communication with India?—I should say, certainly; I have no hesitation in saying that.

1425. In the Hercules, the vessel you named, is the boiler iron or copper?—Iron; and it is a very great advantage indeed presented by Hall's condensers, that it enables you to retain the use of iron boilers, because iron boilers, are certainly stronger than copper ones.

1426. And you do not apprehend the same liability to accident with an iron boiler, while using Hall's condensers, that you would with an iron boiler without them?—No question about it, because it totally prevents incrustation, and it renders the Welsh coal more valuable.

1427. Are you aware that there exists a very essential difference in the nature of the water of the Red Sea and the Indian Ocean; that in the one sea the water is much more saline than the other; has a greater proportion of sulphuric acid and lime?—I suppose the water of the Red Sea would be the most impregnated; I should imagine so, there being no rivers discharged into it, and the evaporation being very great.

1428. Assuming that to be the case, of course you are aware there would be a greater liability to incrustation?—There would, under those circumstances.

1429. Then any difficulty likely to arise from the necessity of often going out uuder such circumstances would be completely obviated by the use of the patent condensers?—Yes.

1430. And do you contemplate any case in which it is possible that incrustation may arise?—There can be no possible way in which it can take place, because he resorts to the very ingenious plan of distilling water from the sea water in a separate vessel; whatever deposit there is takes place, that is in a separate vessel, so that the boilers, and the engines are worked with pure water. It is not only the boiler, but the engine likewise, which will suffer very much from the hot salt water; the injection of sea water impregnated into the condensers, in the course of time, insures the effect of the engine, and likewise destroys the condensers.

1431. In Collyer's boilers there is an improvement, which I should think applicable to any steam-engine; I wish to know whether you are acquainted with the safety or breathing pipe, so called by Mr. Collyer?—No, I do not recollect it.

[Adjourned till Thursday next, at Twelve o'clock.

Jovis, 6th die Julii, 1837.

MEMBERS PRESENT.

Lord William Bentinck.
Mr. Gordon.
Mr. Hutt.
Mr. Mullins.
Mr. Young.

LORD WILLIAM BENTINCK, in the Chair.

Samuel Briggs, Esq., called in; and Examined.

1432. *Chairman.*] WHAT are you?—A merchant in London, and at Alexandria in Egypt.

1433. How long have you resided and been engaged in business in Egypt, and are you now engaged in any house or firm there?—My connexion with Egypt commenced with the conjunct expedition under Sir Ralph Abercrombie and Lord Keith in 1801, and on the evacuation of the country by our forces at the peace of Amiens I was appointed his Majesty's consul at Alexandria, in 1803. This office I resigned in 1810, but established a commercial house at that port, and have visited the country four times since. I have resided in it at various periods more than 2 years, and my house still continues there, under the firm of Briggs & Co.

1434. During that time, had you ever occasion to go to any part of India, and are you generally acquainted with the commerce of India and the Red Sea as it has existed during your residence in Egypt?—About 20 years ago I visited Bombay by the route of the Red Sea, embarking at Suez and returning by Cosseir. It was an object with the Pacha of Egypt (the same who now governs the country) to open a commercial intercourse with India, in which he embarked largely himself, but the moment was very unfavourable (from 1817 to 1819), and the trade was relinquished; it was at the period when the free trade was in full operation, both in India and in England. The natural consequence of this sudden competition was, throughout India, a great depreciation in the price of imports, and a large advance on all exports, which produced ruinous effects in England and throughout Europe as well as in Egypt. The fiscal regulations of the Egyptain government would, under ordinary circumstances, have defeated the enterprise, and a duty on imports from India was levied of nine per cent., including custom and escort duty, besides two Spinish dollars per camel load of goods in addition to the regular hire

1435. Are you aware of any political or fiscal regulations of the Viceroy of Egypt which would in any degree impede the progress of passengers, or such merchandize as is likely to pass by steam navigation through Egypt to India?—The Pacha of Egypt, Mahomed Ali, has always been friendly to a commercial intercourse with India as well as with Europe, and is disposed to afford every protection to trade across the Desert to Suez, and by the route of Cosseir and throughout the Red Sea, wherever his power extends. To insure, however, his cordial co-operation, it would be necessary to enter into a special negotiation on these points; all depends on his will; he can promote or thwart the trade at pleasure; but by the favourable dispositions he has always manifested towards England, much may be obtained by tact and conciliation. To passengers going to or coming from India the Pacha has uniformly given every assistance, and they have passed through his territories as safely as through any part of Europe. The nullity of the trade in English ships under the former onerous duties, and the more enlarged views of commerce and politics now enterained by the Pacha, may possibly induce him to consent to a modification of the custom duty, and place it upon the same footing at Suez and Cosseir as at Alexandria.

1436. Would the Viceroy of Egypt be likely to grant permission for the free transit of all goods across the Isthmus for re-exportation, without the necessity of opening the packages, on the payment of a moderate sum in the gross per annum, or for a moderate *ad valorem* transit duty on an English custom-house certificate, or in any other mode which you can suggest, by which the opening of packages in passing through Egypt would be avoided?—The transit of merchandize through Egypt for re-exportation without opening the packages could only be arranged by special agreement with the Pacha; but he possibly might be induced to allow such transit on trial for one or two years, on payment of a fixed sum in the gross per annum, or for a moderate sum *ad valorem* on an English custom-house certificate, care being taken that the full duty be paid on all goods intended for the consumption of the country.

1437. Do you think he would willingly enter into such a negotiation?—I do.

1438. What are the articles of merchandize which in your opinion are the most likely to be conveyed by steam vessels from England to India, and *vice versâ*, in the event of a regular monthly communication being established between the two countries?—In ordinary times, such goods only as are of comparatively small compass and great value could be expected to go by the Desert to Suez and India, as all heavy goods of comparatively small value would continue to go by the Cape. When the communications by steam become regular, and confidence is established, no doubt both imports and exports by the Red Sea would progressively increase. The articles likely to take that route are coral, cochineal, both of Turkey and Egypt, quicksilver from Trieste, and then fancy silk stuffs and fine manufactures, white lead, larnetto, foil or tinsel, of which there is a large consumption, bullion, books, periodicals, &c. to India, and from India, raw silks and silk goods, indigo, shell lac, cloves, cassalignea, cinnamon, nutmegs, and other spices, pearls, tortoise-shell, Cashmere shawls, gums, tea, coffee, pepper, aloes and other drugs.

1439. In the event of the packages not being opened in Egypt, would there, in your judgment, be any danger from plague or other infection from goods imported into England or India, conveyed in closely soldered tin boxes, enclosed in wooden cases, iron-bound, or not corded, such goods being originally shipped at a clean port?—Goods originally prepared at a clean port in Europe, if closely soldered in tin cases, or enclosed in oil-skin covers and strong wooden cases, iron bound, without cords externally can be in no danger whatever from plague or other infection, if suffered to pass through Egypt unopened that I can speak positively to.

1440. What interruption does the plague give to commercial transactions and intercourse amongst Europeans in Egypt; at what season of the year does it chiefly prevail, and does it ever entirely cease; does it periodically appear every year, or for how long does it occasionally disappear?—The plague does sometimes in the spring months interrupt trade among the Europeans and native Christians in Egypt, particularly in manufactures and such articles as are supposed to be susceptible of contagion, but whenever it does prevail in spring, it always ceases in summer (and that I speak from a long experience there) with the great heat, at Cairo and in Upper Egypt about the end of June and at Alexandria and in Lower Egypt about the end of July; during the remainder of the year the country is free from plague and is healthy. At intervals the plague ceases altogether for eight or ten years, as from the year 1803, to 1813, and subsequently at other intervals; after a total cessation of some years it usually is very destructive the first year that it breaks out again, but the principal victims are the diseased, dissolute, ill-fed and dirty natives of the lower orders, and Europeans of the same description. It very rarely attacks the middle and upper classes, who are temperate and cleanly in their persons and habits, though exceptions are sometimes to be found. After the first year, when the most diseased have been swept away, if it does show itself in the following spring it is generally of a milder character, and always ceases at the summer solstice; and though it may re-appear for a succession of seasons, from March to June, and sometimes in January or February, it gradually loses its malignancy, until the disorder becomes extinct for a number of years. In ordinary seasons it is not more fatal than typhus, cholera, and some other maladies which periodically visit Europe, with the exception of the month of March to the end of May, when the river Nile is at the lowest and the hot winds prevail. The climate is one of the finest in the world, though in general it is supposed to be one of the worst. Few climates can be compared to Upper Egypt from October to February, as it rarely or never rains, and the country is covered with verdure and freshness. In summer the upper country, and indeed all Egypt, is exempt from rain, and the weather is hot, but at Alexandria and in Lower Egypt the cool refreshing winds from the north and west set in regularly from the summer solstice to the equinox of September, and the heat is then really oppressive. The Nile rises from June to October, when the rains of the south-west monsoon fall in Abyssinia, but never in Egypt, which is fertilized by the river. Abyssinia and the Mediterranean coast is exposed in winter to rain, like any other part near the sea, but it rarely extends more than 30 or 40 miles inland. Much merit is due to the Pacha of Egypt for his endeavours to prevent the introduction of the plague into the country from Constantinople and other parts of Turkey and Barbary, whence pilgrims to Mecca frequently come in great numbers, closely stowed on board small vessels, with scarcely any comforts, and where fevers and other disorders are generated, and frequently degenerate into plague. It has often been traced to these swarms of pilgrims that come from Constantinople, and from Algiers and Tunis, by being crowded on board vessels. At the recommendation of the European consuls resident at Alexandria, not only did Mahomed Ali, the Pacha, consent many years ago to establish quarantine regulations at Alexandria, but delegated his authority in those matters *to a committee composed of the foreign consuls and other experienced individuals, so that the danger is much diminished to what it was 30 years ago. There is no want of medical attendance in Egypt, and some of the English and French doctors have fearlessly and successfully treated many plague patients.*

1441. What would you suggest as the best mode and route of crossing the Isthmus of Suez from Alexandria, and in what period might it be done by passengers without extraordinary fatigue and inconvenience; and would the same time be sufficient for the conveyance of such merchandise as would be likely to pass by that route?—The Isthmus of Suez to Cairo, like the Desert between Cossier and Kench, or Thebes, on the Nile, can be crossed at all seasons without any particular danger or extraordinary fatigue or inconvenience, if passengers are provided with tents, and take with them the necessary supplies of provisions, water, wine, and their usual comforts. The journey from Suez to Cairo is usually performed in three days, sometimes, with light baggage, in two days, the distance being 72 miles. A special messenger, by dromedary, may perform the distance in one day, and even less; the route by Cosseir, either to Kench or Thebes, on the Nile, is about 125 miles, and the journey generally occupies five days; both roads are of hard gravelly sand, fit for carriages, with trifling exceptions, which could be removed without any great difficulty. No carriages, however, are to be procured in the country, though the Pacha and some of his court have of late years introduced several from Germany and England for their own private use. The only present mode of conveyance for baggage and merchandise is by camels, and for passengers by mules, horses, dromedaries, and asses of a superior breed; all these have easy paces, but the motion of the camel is very laborious, so that this patient, useful animal is seldom used but for the transport of baggage; its usual pace is two miles and a half per hour; but though the other animals travels quicker it is not prudent for travellers to separate from their supplies, but they may let them proceed on for an hour or so before them. In the Desert between Cosseir and Kench or Thebes, on the Nile, the difficulties which formerly existed, for want of water, have of late years been removed, as two English borers, with a Swiss mineralogist, were employed for two years, 1831 and 1832, in sinking new wells and deepening the old wells, so that now there is plenty of water along the whole line of 125 miles, at convenient distances; so much so, that when the old wells formerly yielded in 12 hours only a scanty supply of five to eight skins of dirty water, there is now a regular supply of eight feet deep by eight feet in diameter, in 12 hours, quite enough for a small caravan. This undertaking was patronized by the enlightened ruler of Egypt, and by his no less energetic son, Ibrahim Pacha, who afforded a native guard and every protection to the two borers and their assistants, who were sent out from England with the necessary implements, and employed in the deserts during more than three years, at the expense of an English gentleman connected with the country, in the hopes it would be of permanent benefit to travellers to and from India, as well as to the numerous pilgrims to and from Mecca; and Mecca and all the coast of Arabia is supplied with corn by this route. Several attempts for water were made in the Desert, between Suez and Cairo, by the same parties and in one place, about midway, with partial success; but after constructing galleries communicating with the shaft to collect the water, it gradually disappeared, so that there is no water in the whole course of 72 miles, except in the vicinity of Suez. It is very likely the complete and partial success which has attended these excavations may induce the Pacha of Egypt to prosecute further attempts, both in Egypt and Syria; and in fact, at his desire, 40 boring drills were sent out to his Highness in the year 1833, the iron rails for which were to be made at his own foundries. I have crossed myself the Desert of Suez three times, in the hottest part of the year, in July and August, and the Desert of Cossier once, in the month of June, without suffering any particular inconvenience; and at that season the nights are chilly, and it is advisable to be provided with cloaks and blankets for many persons are disposed to travel by night in preference; though the sun is very powerful by day, and the heat is increased by the reflection of the sands, the dews are also very heavy. The introduction of palanquins, with Indian bearers, for the use of ladies, or even gentlemen, would be a very great accommodation, and probably would be patronized afterwards by the Pacha and his court, and be the means of inducing several sets of bearers to settle in the country, which would materially facilitate the intercourse between India and Egypt. This might likewise be promoted were the Pacha to encourage the settlement in Egypt of part of the redundant population of Indian Mahometan labourers; they come up to Mecca to perform their pilgrimage, and were he to encourage them I think that it would materially facilitate the intercourse; and also Indian Mahometans for the cultivation of the the soil, numbers of natives having of late years been much drained for recruiting the army and navy of the Pacha, to the detriment of agriculture, in general the source of the wealth of Egypt. Many hundreds of Maltese labourers and artisans have for years been settled at Alexandria and Cairo, and obtain a livelihood which they would not in their own island; and an arrangement with the Pacha for encouraging Indian settlers in the upper provinces would be likely to prove beneficial to both countries, and cement the connexion between them.

1442. Are there any roads, or might they be readily constructed, by which carriages could pass any portion of the distance from Alexandria to the Red Sea, and by what route?—When I quitted Egypt, six years ago, there were no carriage roads between Alexandria and the Red Sea, but they might easily be made between Cairo and Suez, and between Kench and Cosseir, in Upper Egypt, where the Pacha has given his sanction and co-operation; and that he is so disposed I know, for five or six years ago I sent out to one of his principal territories an English stage-coach, by his particular desire, and he then had the intention of making roads, and he has had carriages for his own use, and I am now sending him

ont two landaus, which I am going to have built here on purpose for him, which shows he has had the disposition, though it has been deferred, for he has so many things in hand, but if once he sees the advantage of it he will do it. The usual route for travellers and goods prior to the year 1820 was by sea, in the country boats, from Alexandria to Rosetta, on the Nile, and thence in other boats by the river to Cairo. But since the formation by the Pacha of the famous canal of Mahmondia, which leads from Alexandria across the country to Atfe, opposite Fou, on the Nile, it saves one-third of the distance to Cairo, besides avoiding the dangerous bar or bogas at the mouth of the river. All passengers and goods go by the canal to and from Cairo, and thence by Suez or Cosseir to the Red Sea, as described in answer to Q. 1441. The Pacha has had it in contemplation for some time to construct an iron railway across the Isthmus from Cairo to Suez, and has had part of the rails prepared in England and sent to Egypt.

1443. *Is there any danger or difficulty in passing through Egypt at present, either from the Arabs in the Desert or otherwise?—There is no danger nor difficulty to be apprehended, from the Arabs in the deserts or otherwise, in passing through Egypt, nor has there been any for more than 20 years, owing* to the vigorous government of the Pacha. The casualties are of very rare occurrence, fewer than in many parts of Europe; as in our days we recollect highwaymen at Hounslow, so 20 years ago there used to be irruptions in Egypt, but latterly, casualties are of very rare occurrence.

1144. Being well acquainted with the commerce of Egypt and India, as well as of Europe, what do you consider would be the ultimate, as well as the present effect, in a commercial view, of establishing a regular monthly steam communication between England and India; in the course of a short time, do you consider that many articles of commerce which now only find their way round the Cape would be conveyed by such steam communication direct?—It is my opinion that if a regular monthly steam communication between England and India be established, many articles of commerce will be conveyed by such steam vessels heretofore have been sent by the Cape; but no heavy bulky goods of comparatively small value would take that route under ordinary circumstances; nor do I think it would be desirable, as it would have a tendency to injure our shipping interests engaged in the trade by the Cape, and consequently would affect one of our best nurseries for seamen, considerations of primary importance to a maritime power like England.

1445. Do you consider that the insurance of articles by the steam communication would be heavier or lighter than what is at present paid round the Cape?—In general, insurance by steamers may be effected cheaper, or at the same rates, as by sailing vessels; but between England or any Mediterranean port and India by the Red Sea there are other considerations which may materially affect the premiums; for it would not be one continued unbroken voyage, as from London round the Cape to Calcutta, or other port of India, but the goods shipped at London would first be discharged at Alexandria, then loaded in boats by the canal of Mahmadah, to proceed by the Nile to Cairo, where they would be landed again, and thence loaded by camels for Suez to be reshipped for India; the breakage and damage to which many packages would be subject by such frequent loading and unloading the goods, and which is repeated at every halt of the camels during the three days' passage of the Desert, would greatly increase the risk of the underwriters, who may be expected to demand a high premium, or to be exempted from all average, which would in many instances operate against this route.

1446. Suppose a necessity to exist, owing to the existence of plague or war in Egypt, for pursuing a course up the Gulf of Akaba instead of the Gulf of Suez and crossing the Isthmus to the Mediterranean Sea, do you think any difficulties would be encountered in that route, either in crossing the Desert or otherwise; and to what part of the Mediterranean would you advise that the steamers from England should go?—Were the plague to exist in Egypt in any violent degree, which rarely happens above once in eight or ten years, though it may in a milder form prevail for a succession of years in the spring months, despatches may still be sent *via* Suez, in perfect safety, in tin or wooden boxes, iron-bound, as mentioned in answer to Q. 1439; small valuable parcels packed in the same way would be equally safe; but merchandize in general it might be prudent to suspend shipping, unless packed in oilskin or wooden cases impervious to the air, supposing that an arrangement could be concluded with the Pacha to pass through Egypt unopened, on payment of a specific sum, as mentioned in answer to Q. 1436. The route by the Gulf of Akaba to the Mediterranean shore is very little frequented, and from its greater distance in the Desert to the seat of government is more difficult to protect; besides which, there is no safe sea port in that direction on the Mediterranean, though anchorage may sometimes be afforded at El Arish, to the eastward of Damietta.

1447. Mr. *Mullins*.] In your answer to a former question, you stated your opinion to be that in consequence of the frequent changes of packages from one mode of conveyance to another there might be a greater risk, and in consequence a higher degree of insurance?—Yes.

1448. Do you not suppose it would be possible to have a different mode of packing and preparation of the different articles, so as to prevent any of those consequences which you appear to apprehend?—It is possible, certainly, to alter the packages and make them more secure; there may be some few exceptions.

1449. In the case of quicksilver do you not suppose it possible?—Yes; they do pack it in iron. I think when once the trade is commenced that many improvements may be introduced.

1450. In fact, that those risks that you apprehend may be met by an alteration in the mode of packing?—Yes; that I dare say it may, in a great measure.

1451. *Chairman*.] You have no doubt of the disposition of the Pacha to give every facility?—No, that I am certain of. It is only a question if he is expected to guarantee this route, or if we will take the chance of them through any other part of Europe; he will protect them as far as possible, but he would not guarantee in case of plunder that he should make good any; if there was a duty stipulated for that, or if he undertakes this iron railway, he probably will say I will take the usual custom duty, and as we pay for our canels and railways in Engand, so he must there have a remuneration. That must be negotiated personally with him.

1452. But you do not consider there is more risk in passing through Egypt in the route described than in any other part of Egypt?—Not at present, nor for 20 years back I do not see there has been any danger at all.

1453. You have stated, so long as the present Pacha lives, and during the reign of his successor, would he ever attain to that dignity, that there is no likelihood of an interruption to the intercourse, but rather an encouragement of it?—Perfectly so.

1454. Do you not suppose that, any circumstances, it would be matter of interest to the governor of Egypt for the time being to encourage a communication with India?—Certainly, provided it does not give rise to civil wars; that is all that I apprehend. We have known Egypt in a state of great confusion when the Mallagaskers commanded; and when a civil war rages in the country there is no security. It is then that the Bangas rob and plunder every caravan; they cannot be controlled; but so long as the governor continues as vigorous as Mahomed Ali, and if it should go to his successor, Ibrahim, or if there is a vigorous governor, there is no danger whatever. But the Arabs never were, for ages back, controlled in the manner they are now by the Pacha; he has organized them, and they see their interest in it.

1445. And you think it likely, that from the example previously set, or the great benefit resulting from the present mode of Government, it is likely that that mode of policy would be preserved, under any circumstances and under any governor?—I should hope so. But I apprehend the Sultan has so great an interest in regaining possession of Egypt, that it may give rise, if he does make any attempt, to throwing every thing into confusion, and may produce civil war again. It appears the Pacha has been conciliating Constantinople to be recognized to himself and his successors on paying a tribute, and there was a disposition apparently on the part of the Sultan to accede to that, and to allow Ibraham if he succeeds to possess all the power of the country, but the Pacha would wish to see it hereditary in his family.

1456. From your knowledge of Egyptain policy, is not your opinion that any other of the European powers may exercise influence sufficient over the Pacha or his successor to induce them to alter their present policy with regard to England?—I am not of opinion that any power could do it unless cause of dissatisfaction were given by England; but it is, I know, the policy and the disposition of the Pacha to encourage the fullest intercourse with this country, notwithstanding all the overtures of Russia and France. I am certain that from the power which England possesses on the Indian Ocean as well as the Mediterranean, we might crush his fleets whenever we pleased, and he is sensible of that, and that is the hold we have upon him; but independent of that, I am sure his own individual feeling is in favour of England; we court him less than Russia and France, who in professions are very liberal always, and he is very politic and shows great attention to those powers, but in fact his feelings are in favour of England, I can vouch for.

1457. In an answer you gave to a former question, did you mean to recommend particularly the route between Cairo and Suez in preference to the route between Keneh and Cosseir?—Yes: that is the most frequented and the shortest across the Desert. The other is more pleasant, perhaps, to passengers; gentlemen who come from India, and have got time to spend, by going to Keneh and Thebes, they have the opportunity there of seeing the finest antiquities in the world; there are none in any part of Europe to be compared to them; and all down the Nile it is a very pleasant navigation; and if they go for the benefit of their health, too, if it is in the winter months, for the winter there is just like the spring of Italy.

1858. In the event of water not being found on the passage between Cairo and Suez, do you apprehend that the want of it would present any serious objection to the communication between Suez and Cairo?—No, I do not apprehend that, for it has always been carried on. There are more difficulties, of course, but then they must take their supplies with them from the Nile; but if water was found there it would then become a regular route, and there would be no difficulty whatever; in fact, might drive a curricle all across that desert; there is only just one or two spots, extending not many yards, where you might blow up the rocks, but it is a fine hard road.

1459. Do you know whether a wheeled carriage ever crossed it?—Yes; the Pacha has passed it with some of his wives, when he went himself to Mocha; on his return the carriage was sent there for them; that was many years ago.

1460. What description of carriage was it?—A kind of English barouche.

1461. A heavy carriage?—A heavy carriage; a four-wheel carriage.

1462. Drawn by what animals?—Drawn by horses; they are excellent horses in Egypt, only you must have your supplies of water and provender.

1463. Up to what period does your information regarding the search for water extend?—Not subsequent to the year 1832 or 1833: the borers came home at that period.

1461. Are you aware that a search has been made since that period and water discovered?—No, I am not.

1465. Have you heard such was the case?—No, I have not heard anything of that, but I should not be at all surprised that if a further attempt should be made it would succeed; the Pacha, with his revenue, can do anything, but for a private individual it would be too much to undertake.

1466. Have you been on the route between Keneh and Cosseir?—I have; I traversed it about 18 years ago.

1467. Do you know anything of the harbour?—It is a very indifferent harbour; the harbour of Cosseir is very small; I have been there in a ship of 300 or 400 tons, but it is not good anchorage when the wind blows from the east or north-east.

1468. You do not apprehend any difficulty in a steamer anchoring there or laying there for a short period?—No; they have been employed there several times; when Sir John Malcolm came, he touched there; I think it was the Hugh Lindsay, and afterwards came up to Suez. When Lord Clare embarked he went to the port of Cosseir, in I think the same steamer.

1469. Assuming that to be the depôt, and a place of general embarkation, should you recommend that a steamer should stay at Cosseir on its way?—Just *en passent*, as they do at Malta; it would be a very pleasant thing, because there is no occasion to be detained more than two hours, just to put passengers on shore; it could be done without any loss of time; but at Suez there is very good anchorage for ships of 800 or 1,000 tons, and during the expedition under Sir David Baird, when the Indian army came to Egypt, they had East Indiamen of 1,000 tons there.

1470. Do you know anything of the Island of Camaran?—Nothing; I stopped at Mocha, and I went down the Red Sea myself, and passed by Camaran, but I had no knowledge of it then.

1471. Is it your opinion a regular passage to and fro of steam vessels would induce the Abyssinians to form a trade, which is known not to exist at present?—It might in progress of time, but they are constantly in a state of civil war, the galley troops and the Abyssinians, so that on that coast there is no safety; from the time Mr. Salt was there on a mission, I believe the country was much in the same state, and there is no safety; they carry goods over to Mocha; make a depôt there for goods and produce of that country.

1472. Do you not suppose that that commercial intercourse would increase?—Yes, that I firmly believe; if once there is security, and that a trade is commenced, I have no doubt that the trade with Abyssinia would increase, but if it continues in a state of disturbance, there will always be insecurity.

The Honourable *John Elliott*, called in; and Examined.

1473. *Chairman.*] YOU belong to the civil service of Bengal?—I do.

1474. How long were you postmaster-general in Calcutta?—From 1829, I forget the month, to December, 1835, I think.

1475. How are the public despatches and correspondences at present conveyed between England and Calcutta?—By sailing ships; entirely by sailing ships.

1476. A very small portion of that correspondence hitherto has come by the overland despatch?—A very small portion of it has come, certainly.

1477. How many days are required for the common post to pass between Calcutta and Bombay in the dry season and in the wet season?—The average to Bombay and from Bombay was 11 days and 11 hours, in March, 1835; that is in dry weather, and in wet weather, in the month of March of the same year, taking an average rate from Bombay, was 11 days, 11 ¾ hours; but this mail was at that time detained several hours at Midnapore, on their way to Calcutta, and at Poonah, on their way to Bombay, which has since been remedied; this will shorten the time about 10 hours. In the wet season, on an average, I should say three days may be added, and in very inclement weather, when the rains are at their height, further delays are occasionally experienced; I have known them as much as two days more, I think.

1478. What was the cause of those delays?—The inundation of the country by the heavy fall of rain, and the filling of the rivers; rendering them even impossible.

1479. Are any of the packets yet lost?—I do not remember any packet having been entirely lost on that road; I have known packets lost for a time owing to the people being taken by tigers.

1480. Are they ever so damaged as not to be legible?—I do not remember an instance upon that road.

1481. Do you remember many instances of the post-runners being taken by tigers?—I think I remember as many as five men being killed upon that road at the time I was postmaster-general: I will not be certain whether there were four or five.

1482. Is there any main road between Calcutta and Bombay?—If by main road is meant a road for wheeled conveyance, there is nothing further than from Bombay to Poonah, that I am aware of, which is 83 miles.

1483. What is the duration of the dry and wet seasons?—The dry and wet seasons, so called in the Post-office, are from the 1st of July till the 1st of November, that is the wet season; and from the 1st of November the last day of June is the dry season. The contract rates are different for those periods; the contractors contract for a different rate of travelling at the two periods of the year.

1484. In what mode are the dawks carried?—On that road they are during the dry weather carried by foot-runners from Calcutta to Ripore; the distance is 535 miles to Ripore, from thence to Omroirtie which is the termination of the Bengal post-office jurisdiction, they are carried in the dry weather by horses, on horseback, and in the rainy season by men; I cannot tell the exact distance of that, but at a rough guess I should say it is upon an average 330 or 340 miles; now, from Omroirtie to Poonah, I believe, a contract has been made since I left India; it was commencing, in fact, when I left India; for the conveyance of the mails, in the same way as above; that is, by horses in dry weather, and by men in wet, and from Poonah to Bombay they are conveyed in a wheeled conveyance of some description, something like a gig I imagine.

1485 Mr. *Mullins.*] At all seasons?—I believe at all seasons.

1486. *Chairman.*] What portion of this route is intersected by unhealthy jungle?—Nearly the whole way from Midnapore to Nagpore is through jungle, and a great part of which is unhealthy at most periods of the year; I cannot exactly define it more closely than that.

1487. The distance being about how many miles?—From Midnapore to Nagpore is about 600 miles, near 650 miles.

1488. Do you know of the intervention of any jungle on the Bombay side?—After leaving Nagpore, I believe there is a good deal of jungle between Nagpore and the Almabad, but I do not know the extent of it.

1489. Do you think passengers landing at Bombay could make this route overland to Calcutta?—Generally speaking, I should say, certainly not; healthy young men might do it at particular periods of the year; but females and children could never do it, and the strongest men can only do it occasionally, I should say at particular periods, under the present arrangement, certainly.

1490 Is there any dawk conveyance of parcels established between Calcutta and Bombay?—There was one established just before I left the office, but I do not think it was quite complete, but there is one now I should imagine; at any rate, whether there is or not it might always be put.

1491.—How many days is banga in passing in the two seasons?—That had only just commenced when I came away.

1492. Mr. *Mullins.*] Can you form any opinion as to the period?—Yes, I can.

1493. *Chairman.*] What is the difference between the ordinary post and the banga between other stations, supposing the arrangements to be as well completed on one road as on the other?—The post from Calcutta to Meerut, a distance of 893 miles, travelled it in March, 1835 in seven days and 20 ½ hours ; the banga, in the month of April in the same year, was about 12 days ; therefore, it is the difference between 12 days and seven days and 20 ½ hours ; it is about a third more.

1494. At what rate do periodicals and parcels go by the dawk banga ?—By the dawk banga the parcels go, and it does not signify whether they are periodicals or what they are, if they go in the banga they go by the weight ?

1495. If persons in Bengal wish to embark to England by Bombay, what route would they be likely to proceed ?—If they wish to embark in steamers ?

1495*. *Yes, by Bombay.*—They would be compelled, I should imagine, to go round by sea from any part of Bengal.

1496. *And do you know what is the length of passage ?—There is a table in this book which gives the probable length of passage all the year, but I never had anything to do with that department at all.*

1497. *I suppose you know when the monsoon is unfavourable ?*—It occupies a very much longer time than I should suppose it would occupy ; 60 or 70 days in the most unfavourable periods of the year.

1498. In short, very few persons from Bengal would avail themselves of that communication ?—In the most unfavourable periods of the year I should think very few.

1499. Also at other seasons ?—At other seasons. I have known some few people go round that way to join the steamers in their present imperfect state, and therefore probably more might go if they were more perfect, but I cannot imagine it would become a general route at all.

1500. If a communication by steam vessels from England to Calcutta could be effected in about two months, do you think the great mass of correspondence would take that channel ?—I certainly think that the greater portion of private correspondence would take that channel if it could be secured under that supposition.

1501. Now, what rate of postage on single and double letters by that communication would you recommend so as to insure its general adoption ?—I think the rate that was adopted by the Court of Directors a very fair rate ; it is a very low rate, I think, and taking it as a matter for the accommodation of the public and not as a matter of revenue I should say it is a very fair rate. I have made a memorandum of that rate from the order which came out at the time I was there. The Court's order of the 23d of February, 1835, directed that letters weighing a quarter of an ounce were to be charged at half a rupee ; that is the steam postage on the Bengal side, not of course the whole way to England. Letters weighing a quarter of an ounce, which are termed single letters, half a rupee, above a quarter, and not exceeding half an ounce, one rupee ; half an ounce, and not exceeding three quarters, one rupee and a half ; and three quarters of an ounce, and not exceeding an ounce, two rupees, and so on, a rupee being charged for every additional half ounce. Single newspapers in covers open at the ends, to be charged the lowest rate, namely, half a rupee. The only objection to this arrangement was that it was made in ounces, which was a weight not known in the country ; it was impossible to put it in force in the form in which it came, it was therefore converted into sicca weights as nearly that rate as possible.

1502. What proportion would you say of the whole correspondence would go by this route from Bengal, supposing it were secure for two months ?—I should think more than half in number of letters, much more than half, but in point of weight, I should not think there would be perhaps quite half, because the heavy letters would be comparatively so heavily charged, that I do not think they would go by that route, and there must be always a number of letters go by sea, because they are connected either with persons or things going in the ships.

1503. Can you give any estimate of the probable return of the number of letters so sent ?—I can give no account of the number ; I have no record of it, and have no means of getting at it here.

1504. Mr. *Mullins.*] Is it your opinion that the number of letters at present calculated to be sent annually would be very greatly increased by the quicker communication between this country and India ?—In my opinion, the more you can improve the communication the greater the number of letters there will be ; in all post-offices improved communication is the first step towards increasing postage.

1505. *Chairman.*] I believe the posts throughout the province of the Bengal presidency were accelerated during the time you were postmaster-general ?—They were.

1506. Have you any table to show in what degree they were accelerated ?—This paper will show to what degree they have been accelerated on the principal roads from the presidency.

[*The Witness delivered in the same, which was read, as follows* :]

(A.)

MEMORANDUM, showing the shortest Time hitherto occupied by any one Dâk between the following Places, in March, April and May 1835.

	HOURS OCCUPIED.					RATE OF TRAVELLING.		
				D.	H.	M.	F.	P.
Calcutta to Patnah	78	hours occupied,	or	3	6	4	5	30
Calcutta to Benares	82	..	or	3	10	5	1	3
Calcutta to Gorrockpore	99	..	or	4	3	5	1	38
Calcutta to Cawnpore	126	..	or	5	5	4	7	19
Calcutta to Delhie	173	..	or	7	5	5	1	0
Calcutta to Kurnaul	188	..	or	7	20	5	1	18
Calcutta to Meerut	175	..	or	7	7	5	0	32¾
Calcutta to Lucknow	122	..	or	5	2	5	0	10½
Calcutta to Jubbulpore	169	..	or	7	1	4	1	32¾
Calcutta to Berhampore	21½	..	or	0	21½	5	6	5¾
Calcutta to Bhaugulpore	49	..	or	2	1	5	5	2½
Calcutta to Dinagepore	48	..	or	2	0	5	3	20
Calcutta to Rungpore	58	..	or	2	10	5	2	30
Calcutta to Dacca	39½	..	or	1	15½	4	6	27
Calcutta to Chittagong	73	..	or	3	1	4	5	14¾
Calcutta to Midnapore	12	.	or	0	12	5	6	0
Calcutta to Sumbulpore	81	..	or	3	12	4	1	5¾
Calcutta to Nagpore	146	..	or	6	2	4	7	11½
Calcutta to Aurungabad	209	.	or	8	17	4	7	20
Calcutta to Bombay	267	..	or	11	3	4	6	10½
Calcutta to Balasore	25	.	or	1	1	5	2	35
Calcutta to Cuttack	40½	..	or	1	16½	5	7	24
Calcutta to Gaugam	70	.	or	2	22	4	7	36½
Calcutta to Madras	240	..	or	10	0	4	3	8½

COMPARATIVE STATEMENT of the Average Time occupied in the transit MAILS.

	Distance.	1828 · TRAVELLED DURING THE MONTH OF MARCH						1835. TRAVELLED DURING	
		Number of Miles travelled during the Month.	Number of Hours occupied during the Month.	Average Number of Hours occupied by each Dak.	Average Rate per Hour.			Number of Miles travelled during the Month.	Number of Hours occupied during the Month.
					M.	F.	P.		
From Calcutta to Patnah	368	11,408	3,968	128½	2	7	0	11,408	2,599¼
From Calcutta to Benares	421	13,051	4,384¾	141½	2	7	5½	13,05	2,888½
From Calcutta toGorrockpore	516	15,996	5,314	171½	3	0	0	15,996	3,358
From Calcutta to Cawnpore	622	19,282	6,414¼	206¼	3	0	3¼	19,282	4,182
From Calcutta to Delhie	887	27,497	9,079	292¼	3	0	9¼	27,497	5,839½
From Calcutta to Hurnaul	974	30,194	9,672	312	3	1	0	30,194	6,424
From Calcutta to Meerut	893	27,683	8,567	276¼	3	1	32½	27,683	5,842¼
From Calcutta to Lucknow	614	19,034	6,114¾	197¼	3	0	35¾	19,034	4,048
From Calcutta to Subbulpore	714	22,149½	7,537	243	2	7	21¾	22,149½	5,803
From Calcutta to Berhampore	124	3,844	1,167½	37½	3	2	18	3,844	724
FromCalcutta to Bhaugulpore	276	8,556	2,672	86¼	3	1	24	8,556	1,993
From Calcutta to Dinagepore	261	8,091	2,799½	90¼	2	7	5¼	8,091	2,040
From Calcutta to Rungpore	310	9,610	3,162	102	3	0	12½	9,610	1,944
From Calcutta to Dacca	191	6,169	1,762¼	57	3	2	31¼	6,169	1,304
From Calcutta to Chittagong	341	10,571	3,255	105	3	2	0	10,571	2,498½
From Calcutta to Midnapore	69	2,139	1,128	36½	2	0	19¾	2,139	415¼
From Calcuttato Sumbulpore	348	10,788	3,366	108½	3	1	25½	10,788	2,744
From Calcutta to Nagpore	717	22,227	7,161	231	3	0	33¼	22,227	5,041
From Calcutta to Aurungabad	1,032	31,992	10,416	336	3	0	22¾	31,992	7,231
From Calcutta to Bombay	1,277	39,587	12,097¼	390¼	3	2	7	39,587	8,856
From Calcutta to Balasore	134	4,154	1,477	47¾	2	6	18	4,154	814½
From Calcutta to Cuttack	241	7,533	2,232	72	3	2	32	7,533	1,476
From Calcutta to Ganjam	349¼	10,826¾	3,427¾	110½	3	1	11½	10,826¾	2,288½
From Calcutta to Madras	1,056½	32,741½	8,662	279½	3	6	9	32,741½	7,721

From *Calcutta* to the undermentioned Places, for the Month of March 1828 and 1835.

1835: THE MONTH OF MARCH.				TIME GAINED.						REMARKS.
Average Number of Hours occupied by each Dâk.	Average Rate per Hour..									
	M.	F.	P			M	F.	P.		
83 ¾	4	3	8	44 ¾	hours, or	1	4	8	pe hour	The time stated in the preceding columns includes all stoppages, whether at post-offices or in the roads, and being calculated on both upward and downward mails, shows a less favourable rate of travelling than has actually been accomplished, owing to some of the downward mails (such, for instance, as that from Delhie) being detained at the junction points on the great line of road.
93 ¼	4	4	4 ¾	48 ¼	— or	1	4	39 ¼	—	
108 ¼	4	6	5 ¼	63	— or	1	6	5 ¾	—	
134 ½	4	5	6	72 ¼	— or	1	5	2 ¾	—	
188 ½	4	5	25 ½	104 ¼	— or	1	5	15 ¾	—	The average includes the time lost in the downward mails at Koorjah, in consequence of the necessity of the Delhie mails arriving at the Chowkie before the Meerut mails come down, or in consequence of the Meerut mails having passed Koorjah before the arrival of the Delhie and Kurnaul dâk, as sometimes happens.
207 ¼	4	5	28	104 ¾	— or	1	4	28	—	
188 ½	4	5	35 ¾	87 ¾	— or	1	4	3 ¾	—	
130 ½	4	5	25 ¾	66 ¾	— or	1	4	30	—	Subject to delay of some hours at Benares to join the mail on the great line towards the presidency.
187 ¼	3	6	22 ¾	55 ¾	— or	0	7	1	—	
23 ½	5	2	8 ½	14	— or	1	7	30 ½	—	This average includes the time lost in Hooghly in anticipation of the Burdwan mail, frequently three or four hours on each dâk.
54 ¼	5	0	30	32	— or	1	7	6	—	
65 ¾	4	0	0	24 ½	— or	1	0	34 ¾	—	Downward mail sometimes detained at Berhampore, in expectation of that from Bhaugulpore and Purneah.
62 ¾	4	7	21	39 ¼	— or	1	7	8 ½	—	
42	4	4	—	15	— or	1	1	8 ¾	—	
80 ¾	4	1	31	24 ¼	— or	0	7	31	—	
13 ½	5	0	36	23	— or	3	0	16 ¼	—	
88 ½	3	7	18 ¼	20	— or	0	5	32 ¾	—	These mails were on this month detained several hours at Midnapore, as they reached that station at an hour where nothing would have been gained by forwarding them to the presidency, as they would have arrived in the night; and at Poona they were in like manner, for the same cause, detained about ten hours daily. A small portion of the improvement in this line has taken placed under the Bombay presidency, by the introduction of a wheeled conveyance between Poonah and Bombay
162 ¼	4	3	14	68 ¾	— or	1	2	21	—	
233 ¼	4	3	15 ½	102 ¾	— or	1	2	32 ¾	—	
285 ¾	4	3	19 ½	101 ½	— or	1	1	12 ½	—	
26 ¼	5	0	33 ½	21 ½	— or	2	2	15 ½	—	*N B* The entry opposite Ganjam will show that 36¼ hours have been gained in the first 349¼ miles of this road, consequently Madras has lost 5¾ hours since 1828.
47 ½	5	0	23 ½	24 ½	— or	1	5	31 ½	—	
73 ¾	4	5	36 ½	36 ¼	— or	1	4	25	—	
249	4	2	0	30 ½	—		3	31	—	

1507. Mr. *Mullins.*] Is it your opinion that the number of passengers between this country and India will be materially increased by the establishment of a communication by the Mediterranean?—That is a sort of opinion which is perfectly applicable to all other countries; we know whenever additional facility is given there is an increased number of passengers. and that no doubt would operate towards India as it would towards all other countries; many people are now deterred by the great inconvenience and the very great length of passage and the sufferings of a long voyage, and no doubt the number would be increased if they could make them in an easier and more comfortable manner.

1508. You think the increased comforts that such passengers would be likely to have in a steam vessel would induce them to pay a larger sum for their passage than they have been previously in the habit of doing by the Cape?—I do not know whether that would operate very largely; I think if it were a much higher rate it would operate very much to check the people from going by it.

1509. Taking the passage money by the shorter route to be 150*l.*, while that by the Cape is 120*l.*, do you suppose that the greater advantages on the one route or the other would encourage them to give the larger sum and still create an increase of passengers?—No, I do not think it would operate very materially to decrease the number of passengers that increase of rate.

1510. You considered the question of passage money?—I have not, more than having to pay a good deal of it in the course of my life.

1511. Do you think that the rate charged by the Cape of Good Hope would be a fair rate to charge on the shorter passage by steam vessels?—Upon my word I am totally incapable of forming an opinion upon that; I do not know upon what ground you regulate the thing at all.

1512. When did you leave India?—On the 10th January 1836.

1513. At that period what were the ordinary rates of passage money by the Cape of Good Hope?—That varies so entirely with the cabins, that I cannot say.

1514. *Chairman.*] State from the highest to the lowest?—I ought to be able to tell; but I really am afraid I cannot; they vary very much in different ships; they vary most exceedingly in different ships; the larger class ships charge [illegible] as much as the smaller class ships, and they vary again very much by the reputation of the captains, and so on, that I cannot say.

1515. Mr. *Mullins.*] In your estimate of letters have you taken into consideration any increase of correspondence likely to arise from the greater facilities of communication?—What estimate of letters?

1516. The estimate that you have just given in your answer?—I was asked what proportion I thought would go; it does not signify if there are a lac of letters or 10 lacs; I supposed that half would perhaps go in that way.

1517. Are you aware of the rates of postage as specified in the proposed new arrangement?—Yes, I am; they are similar to the ones I before enumerated.

1518. Is it your opinion that a land communication between Bombay and Calcutta or Bombay and Madras could be made safely for the conveyance of passengers generally?—I do not think in the present state of the country it could; certainly not for passengers generally.

1519. You therefore think it would be an advantage of great importance that there should be a communication established between the different ports or presidencies of India, so that passengers should not have to pass by land and suffer that inconvenience which they do at present?—I think it would be a very great individual accommodation, a very great accommodation to the public generally in the way of getting from one country to the other.

1520. I think you stated, in an answer to a former question, that accidents have sometimes occurred to the mails in their conveyance?—Yes.

1521. Do you know whether that has been the case on many occasions?—With regard to the tigers, I stated before I had known four or five men killed by the tigers.

1522. With regard to accidents occurring from other causes, in rains are you not aware that the mails have been sometimes seriously damaged?—I do not think more so than on other roads; I really do not think over the whole country the last rains I was there there were half a dozen wet wallets.

Dr. *Dyonisius Lardner*, called in; and Examined.

1523. Mr. *Mullins.*) I BELIEVE you have devoted yourself to scientific pursuits for many years?—Yes, and particulaaly to those branches connected with steam; yes, I have been a good deal employed in that way.

1524. You have considered also the question of steam communication with India in its various bearings?—Yes; I have been a good deal engaged in the consideration of it, first, as a subject of general, statistical, and mechanical inquiry, and I was subsequently expressly engaged in it by persons who are interested in having the question sifted in all its bearings, at whose suggestion and by whose wish this pamphlet has been prepared *(producing a pamphlet)*.

1525. You have, in this pamphlet of yours, given your opinion as to the number of vessels and the sizes of those vessels, the tonnage and steam power of those vessels, that should be employed between Alexandria and India?—Yes.

1526. Perhaps you will have the goodness to repeat that opinion, in order that we may have the advantage of it in evidence?—I take it that to establish a line of communication between Egypt and India, which could be carried on with certainty and regularity, and which would meet the difficulties which necessarily must arise from the distance, from the mechanical skill, and from the peculiar fiscal and geographical circumstances connected with the route, such as the monsoons, that they ought to be vessels of the most efficient and powerful description; and I have proceeded upon the supposition, that mere economy as to expense was a matter altogether of secondary consideration; with those views, I would recommend vessels of about 1,000 tons burthen and 250-horse power; and I would recommend the whole establishment of vessels on the eastern side of Egypt to be of one perfectly uniform character, every one to be a counterpart of the others; so that every spar, and every part of the vessel, both nautical and mechanical, could be interchanged one vessel for another; the vessels, in fact, should be duplicates of each other. Then I would recommend the voyage to be divided into stages, and each stage to be worked by separate vessels, for reason that it would be very easy to explain, connected with the nature of the application of steam to nautical purposes. It is found that steam engines applied to navigation require to be cleaned, adjusted, and examined at moderate intervals of time; if you do not do so the engine will not continue to work with any advantage; it will get lamed, crippled, and inefficient; that is one circumstance which puts a limit to what I would call the stages of the steamers; another is this, that if your stage be long you must carry so enormous a quantity of coals (fuel) with you that all the valuable tonnage of your vessel will be occupied in that way; for this, and many other reasons, which perhaps it would be tedious to detail to the Committee, connected with the mechanical part of the vessel, after all the consideration I have been able to give it, I should recommend the voyage from Calcutta as a starting point to be split into two stages of this kind: the vessel leaving Calcutta and touching at Madras, would go to Ceylon to Point de Galle, or whatever harbour might be selected in Ceylon; Point de Galle is the best; then that vessel should stop, and the passengers and the despatches, and whatever cargo there might be transferred to another vessel; that vessel might go to Socotra; and I would advise a station of refuge to be established at the head of the Maldives, then another line should communicate between Socotra and Bombay, so that that steamer would meet the Ceylon steamer at Socotra, Socotra being a common rendezvous. Then from Socotra to Suez it might be necessary to have an intermediate station, and that (the best, as far as I have been able to ascertain, which can be selected, all circumstances considered) would be the island of Camaran; it occupies a position very nearly midway between Socotra and Suez, and it has what, in my opinion, is an advantage of very great moment indeed: it is insular, and it is furnished with one of the very best harbours in the Red Sea; it is a harbour which lies on the inner side of the island, next the main land; you can approach it by ships of almost any burthen; there is no bar nor anything across the strait or passage to prevent you, and ships of any magnitude that can be wanted will lie within three or four yards of the shore. Then from Camaran to Suez is a practicable distance, of about 1,000 miles, touching at Cosseir; then the steamer that leaves Socotra I would have stop at Camaran, and after another change from Camaran to have a steamer plying between Camaran and Suez, so that there would be separate steamers for each station; that is five distinct lines or runs of separate steamers.

1527. *Chairman.*] How many would you have for each station?—One would be sufficient for the regular work; there would be an abundance of time for each.

1528. What would be the total establishment of steamers for those different stages?—I should think that six or seven would be an abundance; for the whole of the eastern side five would keep up regular work, and then you would have one or two spare steamers; I mean those for the regular month work, from month to month; one steamer would do for each station, but in the event of accidents you should have a spare one or two to take the place of any of those that were damaged; not that even that would be necessary, if it were thought a matter of great economy; for example, suppose that the steamer between Camaran and Suez met with an accident the steamer from Socotra could go on to Suez; still it would be prudent to have one or two spare vessels to lay on when occasion might require.

1529. *Mr. Mullins.*] You are aware that great impediments are offered in a direct passage from Bombay to Socotra?—In certain months of the year.

1530. Then, looking to the impediments so offering themselves at certain periods of the year, is it your opinion that a vessel of the size you have already stated would be the best vessel to cope with the monsoon?—Decidedly; it is that fiscal impediment of the south-west monsoon which mainly induces me to recommend vessels of that large tonnage and power.

1531.] It has been already stated in evidence, that vessels of about 650 tons, with a proportionate horse power, would be considered quite powerful enough for any obstruction that might arise from the south-west monsoon, and would answer every purpose that a larger vessel could be expected to answer. Why is it that you suppose that a vessel so much larger would be superior in many respects to the smaller ones?—Because from the experience I have had already of steam-vessels, I have found that those vessels of inferior tonnage and power are not equal to the larger vessels. I can show the Committee the result of an examination I have made of a number of steamers, chiefly Government steamers, and I find that the smaller vessels, although they are equally well constructed in their machinery, and have no defect about them that I can discover, but merely their small size, that they are not able to cope with adverse weather in any degree approaching to the larger class.

1532. Do you speak now of such vessels as the Atalanta and Berenice, which have been already fitted for that station?—I do; I have had the experience of several vessels quite equal to them, and I should say perhaps even in some respects superior to them in details; I have examined with great care the performances of nine of the Government steamers, differing from each other in various particulars, and I find that the most efficient of these is the Medea, a steamer of 800 tons burthen and 220-horse power. Now, I have examined these with very great care, and, if the Committee will allow me, I will put in the result of the inquiry I have made. The way I have considered the question is this: the efficiency of a steamer is best determined by the actual quantity of coal per horse power which she will consume in going over a given distance: I do not care about the time; it is a matter of no importance whether she goes fast or slow; the question is, how much coals will carry her 1,000 miles, or how many thousand miles a given weight of coals will carry her; that I call the locomotive duty; I find it so useful, that like every term introduced into general inquiry, you must have a name for it, and I have called it the locomotive duty of coals; by the locomotive duty, I wish to be understood to mean the number of miles over which one ton of coals per horse power is capable of transporting a vessel. Now, I have examined the performances of a number of these vessels, which I will now put in.

[*The same was put in and read, and is as follows:*]

(B)

NAME.	Tonnage.	Length.		Breadth.		Power	Diameter of Cylinder.	Length of Stroke.		Construction of Wheels.	Diameter of Wheels.	
		Ft.	*in.*	*Ft.*	*in.*		*Inches.*	*Ft*	*in.*		*Ft.*	*in.*
African	246	110	0	24	11	90	38	3	6	common	13	6
Blazer	410	145	0	28	5	100	44¼	3	6	feathering	17	4
Confiance	246	111	0	21	10	100	40¼	4	0	ditto	18	0
Dee	639	166	0	30	4	200	53⅜	5	6	common	20	0
Firefly	473	155	0	27	9	140	44½	4	6	ditto	18	6
Flamer	414	155	0	26	5	120	42	4	0	feathering	17	4
Medea	807	179	0	31	11	220	55½	5	0	ditto	24	6
Pluto	295	135	0	24	2	100	39½	3	6	ditto	16	6
Tartarus	410	145	0	28	5	100	39½	3	6	ditto	17	8
Dolphin	340	..	..	..	..	160	48½	4	6	common	18	10
Pr Steamer (A)	660	..	..	..	..	220	56	5	0	ditto	22	0

NAME.	Miles.	Hours	Pounds.	Power.	Rate.	Lbs. per horse power per hour.	Locomotive Duty, Miles.	Observations.
African	19,996	3,894	3,834,544	90	5 13	10.94	1.054	Government Mediterranean steamers
Blazer	10,340	1,645	1,693,020	100	6.28	10 2	1 500	
Confiance	14,130	2,279	2,261,196	100	6.20	9.9	1,389	
Firefly	14,180	2,206	3,110,688	140	6.246	10 7	1,308	
Medea	9,240	1,176	2,153,508	220	7.8	8 3	2.105	
Pluto	6,360	986	954,240	100	6.45	9.67	1.501	
Tartarus	5,060	911	996,500	100	5.55	10.68	1.151	
Dee	7,539	1,161	1,933,092	200	6.49	8.3	1.754	Government West Indian steamers.
Flamer	4,697	780	1 000,272	120	6.0	10.7	1.256	
Dolphin	65,750	.. .	..	.. ..	9¾	12.0	1.820	Post-office steamer.
	22,400	.. ..	... ...	.. ..	7.7	12.5	1.379	Scotch steamer.

The result of these inquiries is a very distinct and decided opinion indeed in favour of vessels of large tonnage with a certain proportion of power, very decided. I should observe, it is not merely these, but a good deal of information, which I could not very well reduce to a numerical form, but of a general kind, from the performances of the Scottish steamers, and of commercial steamers in various other parts of our channels, and the invariable result of all these inquiries and this information converges to the one point, to favour vessels of large tonnage, with a proportion of one to four in their horse power to their tonnage.

1533. *Chairman.*] It has been already stated that the proportion of one to three was the proper proportion; why do you prefer one to four?—The proportion of the power to tonnage must be entirely determined by the voyage which the vessel has to perform without a relay of coals. In short trips the best proportion is that of one to two. One of the most efficient steam ships which has ever been constructed is one which has recently been placed upon the station between London and Hull, which is a vessel of 800 tons burthen and 400-horse power. Another instance of the same proportion used with success is the Post-office steamer called the Dolphin, which attained a greater average speed than any other steamer with which I am acquainted.

1534. Mr. *Mullins.*] State where she plies between?—Dublin and Holyhead. But it is obvious that if a long trip be contemplated, of the spare tonnage of the vessel a larger portion must be given to the fuel and a lesser portion to the machinery, consequently the proportion of the power to the tonnage must be less than in shorter trips. The proportion may vary from one to two, or say from one horse to two tons, to from one horse to five tons, according to the length of the trip. The state of weather to be encountered is also in some cases to be considered: when very adverse weather, such as the south-west monsoon or the westerly gales of the Atlantic are to be encountered, we cannot prudently venture a very small proportion of power, and I would not under such circumstances ever advise a less proportion of power than one horse to four tons.

1535. It is your opinion that that would be the best proportion that could be under such circumstances?—I am distinctly of that opinion.

1536. *Chairman.*] You are of opinion that that proportion would be sufficient?—Amply.

1537. Mr. *Mullins.*] Do you take into consideration the vessel making headway going directly against the wind in the south-west monsoon?—No; a steam ship never would do it; a steam ship would tack just like a sailing vessel, tack wind on beam, and steal along in that way, and take advantage of the gales. The south-west monsoon, as his Lordship is aware, is not a wind that blows everlastingly with unabating and unaltering force; the south-west monsoon is liable to lulls, liable to variations of intensity; whereas in the south-west monsoon, perhaps the most violent one, the vessel would lay-to, and when it mitigates the vessel would tack more or less, according to the force of the wind, and during the lull would go with her head fair for her course, and would get on in that way. But as to the mere practicability, putting profit and expediency and everything of that sort out of the question, as to the mere abstract practicability of a steam ship such as I have described making Socotra from Bombay in the south-west monsoon, I put it in this way: I have ascertained by the calculations which I have put in, that a vessel of the kind I have described is capable of being transported 2,100 miles by a ton of coals per horse power in average weather. It is easily shown that a vessel of that kind, allowing a fair proportion of space for passengers and everything else, is capable of carrying a ton and a half of coals for each horse power; consequently, she is able to carry coals that would propel her, in average weather, 3,000 miles, or 3,200 miles; she starts, then, from Bombay with power in her under average circumstances of going 3,200 miles, with 1,200 miles before her. If, therefore, the adverse circumstances of the moonson be admitted to be such as to obstruct her compared with average weather, in the proportion of 32 to 20, she will still reach Socotra; she still has that in her which will enable her to reach Socotra. But another expedient presents itself; let us suppose—though I do not admit it—but let us suppose that it was found, after a fair trial, inexpedient to make that passage from Bombay to Socotra against the monsoon, still most unquestionably this could be accomplished; the steamer could make the head of the Maldives from Socotra; that she could most unquestionably? the distance quite within what I have seen steamers capable of; she would be sufficiently oblique to the monsoon to do it. At the Maldives she would meet the Ceylon steamer, and from the Maldives the monsoon would not be so directly against the vessel that she might not go to Socotra, or she might go from Bombay to Point de Galle during the monsoon; there would be no difficulty in that; and then starting from Point de Galle there would be no difficulty in making Socotra during the south-west monsoon, because they have only to go a little south and they can soon convert the monsoon into a favourable wind; they could go a great part of it without steam at all.

1538. Assuming a vessel leaving Bombay for Socotra to make her southings and tacks in the way you mentioned, what average rate do you estimate her progress to be?—Such a vessel as I describe will, in average weather, fully accomplish eight knots an hour, and I suppose that under such circumstances it would not be too much to say that that would be reduced to something under five; five would not be an unfair estimate, or four and a half.

1539. In the south-west monsoon—Yes, four and half.

[Adjourned till To-morrow, at Twelve o'clock.

Veneris, 7th die Julii, 1837.

MEMBERS PRESENT.

Lord William Bentinck.
Mr. Gordon.
Mr. Hutt.
Mr. Mullins.
Mr. Young.

LORD WILLIAM BENTINCK, in the Chair.

Dr. Dyonisius Lardner, called in; and further Examined.

1540. Dr. *Lardner.*] I wish to explain more explicitly a question of some importance that was put to me yesterday, as to the best proportion between the power and the tonnage of steamers. The best proportion between the power and the tonnage of steam ships will depend altogether on the length of the voyage; the space devoted to the propelling power is necessarily limited, and is distributed between the machinery and the fuel. The more powerful the machinery the better. But as there must be fuel to carry the vessel through her whole trip, the space occupied by the machinery will be proportionablv limited. Therefore, the longer the voyage the less proportion must the power of the machinery bear to the tonnage of the vessel. If physical obstacles, such as the monsoon in the eastern seas, or the western gales of the Atlantic, are to be encountered, there must, on the other hand, be power sufficient to enable the vessel to make way against them. Therefore, we are on the one hand limited in power by the length of the voyage, and on the other hand we are compelled to provide power sufficient to encounter those obstacles. In the shortest class of trips, such as the Channel trips, round the east coasts, a proportion of one to two is the best. In the longer class of trips, such as trips extending from 600 to 1,000 miles, a power of one to three may be used, and in the longest class of ocean voyages, such as those between India and the Red Sea, or between Europe and America, the proportion should be one to four, or one to five, in order to leave sufficient room in the vessel for the fuel necessary to propel her through her whole trip.

1541. *Chairman.*] How far would the speed be affected by these proportions?—The speed would be affected by them of course; the more powerful the vessel the more powerful the machinery is, or to speak more correctly, the greater proportion the power of the vessel bears to the tonnage, the greater will be her speed, but the consumption of fuel will be nearly the same, that is to say, a ton of coals will carry the vessel nearly the same distance, whether you have very powerful machinery or machinery of less power. The difference will merely be that the ton of coals carries her faster in the one case and slower in the other.

1542. I wish to know the degrees of speed of these different proportions?—This I can give the Committee approximately.

1543. Let us suppose a 1,000 ton vessel?—A 1,000 ton vessel provided with engines 500 horse power, which would be what I would adopt for establishing such a vessel between this and Hull; if the vessel was constructed with the very best machinery, and the best possible model, that vessel would, I dare say, go 10 knots an hour.

1544. Let us take it at 800 and 400?—That vessel, in average weather, will certainly accomplish from 10 to 10 ½ knots an hour; but reduce that to 800 tons burthen, and 250-horse power, the speed will probably be reduced to eight or eight and a half knots, and reduce it then to 200, from seven and a half to eight knots. That is the lowest. A vessel with one to four you may reckon in average weather doing very nearly eight knots. It is better to give the fact upon which that may be proved; the Medea, which is the vessel I mentioned to your Lordship yesterday, is a vessel of 800 tons burthen and 220-horse power; she is fitted with excellent machinery and is a beautiful model, and I have taken the performance of that vessel for nearly 10,000 miles, and her average rate for 10,000 miles was seven knots and seven-tenths.

1545. Do you know what was the maximum and minimum of her speed?—I do not bear it in recollection now, but I could tell by reference to my papers.

1546. Mr. *Mullins*] Have you any further remarks to make on the subject you were upon?—I do not recollect that I have.

1547. The Committee are anxious to ascertain why it is that you prefer a vessel of 1,000 tons and a proportionate horse power, to vessels of the size of the Atalanta, or the Berenice?—From an extensive examination of the performance of steamers of various amounts of tonnage and power, I have found invariably that the vessels of the larger tonnage are more efficient in rough weather than the smaller vessel invariably; and that that efficiency which they have in rough weather affects their average performance in a very sensible degree.

1548. Taking a vessel of the size of the Atalanta or the Berenice, which is about from 600 to 660 tons, and a horse power of from 200 to 230 tons how many tons, will there be for the conveyance of a cargo in such a vessel, over and above the necessary supply of fuel which such a vessel should take for so long a voyage as one between Point de Galle and Socotra, in the south-west monsoon?—I do not think that vessel could carry any cargo at all, supposing her to steam it the entire way in the south-west monsoon; such a vessel as you have described, taking her from Point de Galle; a vessel so small as that, with such a large proportion of power.

1549. Is that your decided opinion, after the consideration that you have given to the powers of steam vessels?—Yes, that is my decided opinion; it is not a vessel that I would recommend to be used. I think that vessel would consume more coals in proportion to her power and tonnage than a vessel of a proper tonnage would do, and she would be more inefficient, she would make less way, and she would be less useful, both for passengers and cargo.

1550. Then if such is your opinion as to the passage between Point de Galle and Socotra, it must be still stronger in the passage between Bombay and Socotra?—Between Bombay and Socotra my opinion is, that that vessel, in most cases of the monsoon, could not go at all, could not make the passage steaming.

1551. Not if she were to tack or to make southings?—Then she would be converted, in fact, into a sailing vessel; if she were to carry that to any very great extent, she would do what a sailing vessel would do; she would run down the coast towards the Maldives until she would get the monsoon on her beam, and then she would make Socotra; she would be struggling against her own deficiency.

1552. So that your opinion is that under such circumstances a steamer of that size would have no advantage over a sailing vessel?—A steamer of that size would not, in my opinion, have any great advantage over a sailing vessel under the circumstance of the monsoon.

1553. But if you take a vessel of the tonnage of from 800 to 1,000 tons, with proportionate power, it is your opinion that she is capable, under all circumstances, of such a passage?—I think she would be capable under all circumstances. I believe I stated yesterday that there are states of the monsoon in which the vessel would be compelled to lay to, she would not make way at all. There are other states of the monsoon in which she would run perhaps within six points of the wind, at others within three or four points of the wind, and then during the lulls she would make direct way, that is to say, she would work on. Now in proportion as you render a vessel less efficient by diminishing her amount of tonnage, you will limit her power of these different means of encountering the physical difficulty, and you will cripple her and bring her down more and more to the level of a sailing vessel. There is an impression that by giving the vessel a greater proportion of power than what I have stated in the case of a hot wind against her, that you can force her against the wind, and perhaps that might influence people who fix upon that proportion of 660 tons, and 230 horse power; but it is found that you cannot do that. That if you had one unlimited power, and were to force her against the wind, she would thrust her head under the water, she would bury herself; you cannot avail yourself of the power; power becomes useless beyond a certain point. My decided opinion is, that one-fourth of her tonnage in power is as much power as can be easily employed against the weather that you will encounter, quite as much.

1554. *Chairman.*] How do you reconcile that with the answer you gave to a former question, that one to two was the proper proportion?—Very easily. The cases where one to two is adopted is in short passages, where they are of course liable occasionally to weather like that; but when they do encounter, as for instance, between Dublin and Liverpool, that is the proportion of power that the best vessels adopt. Now every one is aware that the westerly gales which that passage is subject to are equal to, or exceed indeed any monsoon occasionally. But in going against the east they never can exert their power; it is possible for them to have the power, but they cannot use it. The time they use their power is when the weather is in an ordinary and moderate state; they will then go on at the rate of from 10 to 11 knots an hour; but I have been in vessels on that passage when they did not make three miles an hour; the power becomes useless; they work the engine under its power; ease the engines, as they call it.

1555. She would be otherwise buried under the waves?—She would bury herself decidedly.

1556. Mr. *Mullins.*] But assuming the south-west monsoon to prevail for only a limited period, then should you, looking to the application of power to the vessel, should you think it advisable to look to the prevalence of that south west monsoon for a certain period of the year, or to look to the advantage you would gain from having an increased power during the other periods of the year?—I do not conceive that you would gain any material advantage, considering the length of the trips, in any increase of power that you could get beyond what I have stated, because the trip between Point de Galle and Socotra is one in which, under almost any circumstances, you could not profitably use more; you would require to have a proportion of power not exceeding what I have stated, even supposing the monsoon was not in question. The monsoon would not alter my estimate with the proportion of power to tonnage of one to four.

1557. Then taking a vessel of the size you propose, with the proportion of power of one to four, what number of tons should you think would be spared for the cargo, over and above the quantity of fuel necessary to be taken?—That of course will depend on the length of the stage; I will take it if you please on the larger stage, from Point de Galle to Socotra, that distance is about 1,600 geographical miles; now a ton of coal per horse power, putting the monsoon out of the question, will carry the vessel about 2,200 miles, therefore about three quarters of a ton will carry the vessel between Point de Galle and Socotra. The vessel has 250-horse power, therefore it will take about 180 tons of coal for actual consumption in the distance; but you must allow for contingencies, and therefore you might put down say 10 per cent. for these, and say 200 tons. The vessel therefore will be thus circumstanced: they have machinery 250 horses, which occupies the tonnage of 250 tons, you have coals 200 tons, which may be taken in tonnage as ton for ton, a ton of coals occupying a ton of tonnage, and that will be 450 tons that will be occupied by the propelling power. The vessel measures 1,000, and therefore there would remain 550 tons of unoccupied space for all the rest of the crew, stores, passengers, cargo, and every thing else. Now that will afford ample accommodation for about 100 first-class passengers, and afford a very considerable space for cargo, which is not of a very heavy description. It is a great mistake to suppose that you can, if you wished it, so fill a vessel with coals that she can hold nothing more, that she shall have no spare space; the fact is, that never can happen, and any one who says so, is ignorant of the real nature of the question. The limit which is imposed to the supplying coals to a steam ship, is not a limit of space, it is a limit of immersion; you can put in coals until the vessel gets such an immersion that the paddle-wheels will not work, you must stop as soon as the paddle-wheel gets immersed to the depth of about her lowest paddle, and after you have put all that quantity of coals in her, you have a vast quantity of space besides what passengers will occupy, a space that passengers cannot occupy, a space in the lower parts of the vessel, and in many parts where you would stow goods, which must not be of a very heavy description. Every trip that you went you would have a spare tonnage for heavy goods; quicksilver would be an objectionable thing because if they sunk the vessel too deep, they could not manage it; but for any cargo of a slight description, however bulky it might be, you would have a very considerable quantity of space.

1558. Can you form an idea as to the probable number of tons that might be spared for such a purpose, without too great an immersion of the vessel in the way you allude to ?—You see from the calculation I have given in, supposing that the measured tonnage of the vessel is its real tonnage, and it ought to be so, then there would be 550 tons for every thing, and the disposition of these would mainly depend on what you calculated would be most advantageous to appropriate to passengers and what for cargo.

1559. Then with regard to the tons weight, can you give any opinion as to the number of tons that can be made available ?—The additional tons, that ought to be limited, because you must not immerse the paddles; and here I would beg to state, in those vessels that have long trips to encounter, I would decidedly recommend that the coal-boxes should be tanked, and that the trim of the vessel should be maintained by replacing the coals by sea-water.

1560. *Chairman.*] Would not that add to the weight at other times ?—No, the weight would remain the same. You may charge the vessel with a certain quantity of coals, in proportion to the trip she has to encounter, and the vessel will go better by having her paddles properly immersed, than if they were less immersed.

1561. Mr. *Mullins.*] You have not yet stated what the number of tons weight would be, that you think a vessel taking that proportion of coals I have just stated at 200 tons, would be able to carry without too great immersion ?—That would be matter of calculation, depending a great deal on the model and build of the vessel; you must not immerse the vessel deeper than her lowest paddle.

1562. What would be the comparative annual expense of a steam ship, such as you recommend, of 1,000 tons capacity and 250-horse power, and one of 660 tons and 230-horse power ?—The power being very nearly the same, there would not be any difference worth consideration, either in the original cost or expense of maintaining the machinery. The establishment of engineers, stokers and cost of everything connected with the mechanism of the vessel would be the same; the annual consumption of fuel would be about eight per cent less; the establishment of the officers and crew would be the same; the establishment at the several stations and depôts would be the same; but the space which could be appropriated to passengers would be greatly lessened, and none would remain for cargo.

1563. What would be the sailing expense of the two on a voyage of 1,200 miles ?—That will be matter of calculation; but if the Committee will permit me, I will give in a statement of it.

(*The witness was requested to do so.*)

1564. What would be the sailing expense of the two, and what would be the difference of time in making the voyage ?—I am sure that the larger vessel would do it in less average time; but in smooth water the smaller and more powerful vessel would be the fastest, *cæteris paribus.*

1565. Mr. *Mullins.*] Is it your opinion that the employment of large vessels would produce other advantages besides those you have enumerated; would not larger vessels create a greater facility of communication by obviating the necessity of taking in supplies of coal so frequently as in smaller vessels, and also the necessity of cleaning the boilers so frequently ?—No, I think the boilers must be cleaned as frequently in the one as in the other; I do not see much advantage in that. The main advantages of the large class of vessels will be these: that they will be most efficient in rough weather invariably, and therefore their average time affected by the rough weather will always be less, but more certain in the passage; accommodate a greater proportional quantity of passengers and cargo; that the expences for the work they do will be considerably less; that if the intercourrse be increased, as from increased facility we always find it is gradually increased, you have the means to meet that; but if you start with small vessels, and you suddenly find the number of passengers or goods, or whatever it may be, to increase upon you, you have no means of accommodating them, except by multiplying your vessels; and it is obvious that to do a given quantity of traffic by a number of small vessels is far more expensive than to do the same quantity of traffic by a smaller number of great vessels.

1566. Have you considered the fitness of the harbours of the Red Sea and Socotra ?—Yes, I have very carefully examined those.

1567. You are aware that there are different harbours which have been recommended ?—I am. It has been erroneously stated that the Red Sea is ill provided with harbours, in which steamers could lie on either coast: now here is an admirable chart, which has been made within a few years under the direction of the Company, of the Red Sea, from the Straits of Babelmandel, and any person conversant with these things, who will take the trouble of examining it, will find that there is ample choice of places on either side, either for permanent stations or for places of refuge. Now here is the place which I have recommended as the intermediate station between Socotra and Suez; this is the island of Camaran, and I understand it has been stated that a bar exists here; the harbour lies inside here, and I understand it has been stated that a bar exists here; there is no such thing.

1568. Just state why you should recommend Camaran to any other station ?—First, because it is insular; which is, I think, very important. The station there, the depôt, the coals, and every thing that is necessary for the supply of the vessels, will be safe from the incursions of wild tribes that would infest it, and from delay. Now when the Hugh Lindsay made her voyages, independent of any disturbance from the Arabs, they experienced very great delay from the local authorities: vexatious difficulties were thrown in their way about getting fuel and things of that sort, which would almost inevitably be the case if you had not a place under your own complete control. If then you had the Island of Camaran, and a hulk established there, or one or more, containing the coals ready to supply the vessels, the steamers would come alongside the hulk, would take in her coals at once; the upper deck of the hulk might be fitted up as a workshop, with all tools necessary for the repair of the machinery, and with abundance of duplicates of those parts most likely to be deranged; such as parts of the paddle wheels and other things, so that when the vessel comes there she would be put to rights and receive her coals without any disturbance or delay. In the same way I would place one or more hulks of the same kind at Suez, with the same view, and at Socotra. The disadvantage of Socotra is the want of well-sheltered harbours; but there are two there, one of which is sheltered and safe in the north-east, and the other in the south-west monsoon, at different ends of the island.

1569. *Chairman.*] You have seen a statement of the present number of passengers that pass between England and India?—Yes; about 3,200 a-year.

1570. Do you think that that number will be increased by the establishment of a regular steam communication?—I have not the least doubt of it, and the ground on which I entertain no doubt of it is this, that in the history of human civilization, I do not believe there is one statistical law so free from exception as this, that in every instance where improved means of communication between centres of populations have been effected, whether the improvements consist in increased expedition or in increased economy, it has been invariably followed by a very large increase of intercourse; numerous examples may be given of it, though not of course applicable to distances so considerable as these. In all the cases where we have seen the railroads established without a single exception, the intercourse has increased in an immense proportion. In some cases the increased economy has, no doubt, operated to a certain extent where the fare has been reduced one half, and the time has been diminished one half; there the increase has gone on in a four-fold or five-fold proportion. In the case between Liverpool and Manchester, where there were 400 persons per day before the railroad was established, there are now 1,600 per day. But as an instance where increased expedition only takes effect without diminished price, I may mention to you other railroads where the price has been actually increased; the price by the road before was less than it now is by the railroad, and notwithstanding that the road is deserted, and the railroad is used exclusively, and the intercourse has increased in more than a four-fold proportion. Now other instances might be mentioned, and very numerous ones, and upon all these grounds I entertain not the least doubt whatever, that if the line of steam communication be established between India and England, and that the time be reduced, as I am sure it may be, under two months between the Eastern presidencies and about six weeks between Bombay and England, I have no doubt at all that the intercourse will be increased in an immense proportion; I have not the least doubt of it.

1571. Perhaps the case most analogous to that of India is Spain, where there is no great commercial or manufacturing population, where the natives are not habitually travellers; do you happen to know whether the intercourse has increased very much since the steam-boats have been established with the Peninsula?—Immensely, not only between Spain, but between every part on the coast of Europe.

1572. Do you know in what proportion the intercourse has increased since the establishment of the Peninsula Steam Navigation Company?—I cannot give you an exact proportion, but I can take on me to say it has increased more than a ten-fold proportion.

1573. What do you mean by tenfold?—More than 10 times the number of persons go, and in some cases considerably more. I will give you an instance of a case where by the diminished price, independent of the increased expedition, an enormously increased intercourse took place. Last year there had been running between London and Boulogne steamers, the fare being I think a guinea and a half a head, and they had been for a considerable time plying in that way. There was an opposition established between two lines of steamers, and they determined, in order to ruin each other as they thought, they determined on reducing the fares to almost nothing, and they reduced them to 5 *s.* each line. The consequence was, that it was not a very uncommon thing for 800 and 1,000 persons a day to be landed at Boulogne, the steamers which began this opposition as a ruinous thing, with the intention of cutting each other's throats, have continued it ever since as a source of profit, and they are still now 5 *s.* a head. It shows how little we know of political economy.

1574. Mr. *Mullins.*] Then it is your opinion that not only will there be an increased intercourse between this country and India, but that the far greater proportion of those who go from this country to India will avail themselves of the shorter r[illegible]y the Sed Sea, in place of the present one?—I am convinced every one will go by it, and I feel [illegible]ed that the fare may be reduced considerably below what they now contemplate with profit.

1575. Have you considered that subject in reference to the fare that ought to be charged, making a due return to those persons who undertake the providing of the passengers?—Yes.

1576. Taking the whole fare between Calcutta and London at what you have stated it, what would be the proportional fares for the successive stages of the voyage?—I take for granted that no one would stop at Socotra. Some few trading with Arabia, might disembark at Camaran, or be dropped at other points on the coast. Short fares should of course be higher in proportion than long ones. If the whole fare from Calcutta to London be taken at 130 *l.*, the following fares would not be unfair for the stages.

	Days. —	Fare. £
Calcutta to Madras	4	10
Madras to Ceylon	3	8
Ceylon to Camaran or neighbouring parts of the Arabian coast.	15	35
Camaran to Kosseir	4	10
Camaran to Suez	7	18
Calcutta to Kosseir	28 ½	65
Calcutta to Suez	30 ½	70
Alexandria to Gibraltar	19	22
Gilbraltar to Falmouth	6	16
Alexandria to Falmouth.	16	36

But I think it will probably be found to be more profitable to reduce all the fares below these rates.

1577. Could you give the charge for the whole distance without dividing it?—I am sure it could be done with a profit for first-class passengers 100 *l.*, and for passengers with inferior accommodation, more closely crowded together in the vessels, for 60 *l.*, and that including their provision. Much depends on the space you allot in the vessel to the passengers and upon the accommodation they require. I understand the class of passengers who now run is generally wealthy, a people who want very luxurious accommodation; in that case you must charge of course a proportionably high fare? but I think 100 *l.*, for the first class, and then intermediate sums for different accommodation, between that and 60 *l.*, or 70 *l.*, would yield a considerable profit; I think it would yield more profit than 150 *l.*, by increasing the number that would go.

1578. Are you aware what the present charges are by the Cape of Good Hope?—They vary very much in different vessels; you can go in some vessels for so low as 90 *l.*, I believe at 80 *l.* you can get out for, and in others for 120 *l.*

1579. You mean for first-class passengers?—Yes, for first-class passengers 120 *l.* is generally paid, I believe.

1580. It has been already stated in evidence that it would be impossible to accommondate the passengers comfortably in steam vessels under from 150 *l.* to 200 *l.*?—Well, that will entirely depend on the number of passengers who go; such a statement as that must be understood in a very qualified sense. If there be a sufficient number of passengers go, they will accomondate them for a great deal less; if you go of course the expense of your enterprize must be shared among few, and therefore high prices must be charged; but I anticipate, from what I see of the actual numbers who now go round by the Cape, and from what I know of the facility that may be afforded them in the steam communication by the Red Sea, and from what I also know as to the general facts of expedition, I have no doubt at all it could be done for the sums I stated advantageously that if 200 *l.* were charged.

1581. Can you give any opinion as to the comparative amount of correspondence and mercantile intercourse between the different presidencies and this country?—Yes, I have got it here; I will give it in if you please. The annual number of letters conveyed between Britain and India at present, or within the last few years, is at the rate of 309,000 annually; of these 54,000 communicate with Bombay, 12,500 with Ceylon, 71,000 with Madras, and 170,000 with Calcutta; so that out of the 309,000, Calcutta has 170,000 and Madras 70,000 that is 240,000 between the two. Then the passengers 3,200 annually, of whom 1,450 go to Calcutta, or between Calcutta and England; Madras 1,050, Ceylon 100, Bombay 600. The estimated gross commerce is nine millions, of which two millions and a half are to Bombay, one million to Madras, and five millions and a half to Calcutta. Now these might be taken to represent the exigency which those different presidencies have for the improved means of communication.

1582. Is it your opinion that any number of letters would be sent by the Cape of Good Hope, when once the other communication is established?—Yes, that of course will depend on the postage.

1583. Taking the postage at what you are aware it is, according to the Act of Parliament, you are aware of that?—I am. The impression I have is this: that a great part of the correspondence, all that part of the correspondance which is of a commercial nature, is of a nature to which expedition is so important, that almost any price would be paid for it; and that the difference of postage which is now proposed is such, that I think all that portion of correspondence would certainly go by the steam communication, and a large portion of correspondence of private families anxious to hear from their friends and relations, would likewise, of the respectable families, all that would go by it. They would not consider the expense, it is quite evident; we have only to appeal to our feelings to know that. Of the letters which at present go free, which amount to 309, 000, about 90,000 of those letters are for private soldiers; these most likely would go round about still, or go whichever way they could be carried cheapest; but there are 220,000, letters that pay postage now, and I think considerably more than half of these would certainly go by the steam communication, even at double their present postage.

1584. Is it your opinion that the commercial intercourse will be greatly increased between India and this country by the greater facility of communication?—Undoubtedly; it always does. Facility stimulates commercial speculations, and it is well known in the commercial world, that nothing has clogged the spirit of enterprize more than the length of time which is now necessary to learn the state of the markets between the two countries.

1585. Is it your opinion that means could be found of preventing any additional rates of insurance being charged by the necessity of changing the cargoes from one vessel to another?—I do not apprehend that much danger will arise from that. The source of danger would most likely be the carrying across Egypt, for one steamer coming alongside another and giving in the only kind of cargo which can be expected here, which is a cargo of light and valuable things; I do not think there would be any great source of injury.

1586. You have devoted a good deal of your time to inquiries into the best machinery applicable to steam vessels for long voyages?—Yes.

1587. The committee are anxious to ascertain what your opinion is with regard to the machinery which should be adopted in vessels intended for such voyages, looking to the improvement lately effected?—The machinery to which the Committee should direct their attantion, consists of two parts, very distinct from each other, namely, the working machinery and the boilers. With respect to the working machinery, I have no other observation to make than this, that I would recommend it to be constructed by the very best makers in this country, of the highest reputation, such as Boulton & Watt, and Maudsley & Field, to insure its excellence at such a distance; that I would recommend the engines to be constructed so as to work expansively the valves to be made in the same manner that they are now being made for the vessel which is being built to work between Bristol and New York, the engines of which are in process of construction by Maudsley & Field. The valves of those cylinders are so constructed that the engineer can cut of the steam at any portion of the stroke he pleases; this is a very great consequence in a case like this, where the economy of fuel is a matter of importance, because in the monsoon for example, it will happen in the monsoon, when you are going with it, it will sometimes happen that you will not use steam at all you will run with the monsoon in the outward passage very often without steam. Frequently it will happen that you will wish to work very much under your power, availing yourselves of the wind to a considerable extent, but helping out the wind by a certain portion of steam, the engine-man will then cut off the steam, perhaps at a fourth or a fifth or a sixth part of the stroke, letting it extend to the rest, and the consumption of fuel will not only be diminished in the proportion in which he cuts it off, but in a higher proportion, from the expansive action of the steam, and therefore I think the expansive valve a matter of very considerable importance. Then with respect to the boilers, it is with respect to the boilers that the greatest difficulty will be left, and the greatest doubt lies about the best mode of proceeding. The difficulties consist in this generally we are obliged to use sea water in them. In the boiling of the sea water, the salt and lime and other solid matter which is held in solution, is precipitated, the steam goes over, leaving these solids behind. After the boiler has been worked for a certain length of time, the salt which remains behind from the evaporated water, mixes up with the water that remains, renders it salter and salter, until at length it becomes what chemists call a saturated solution, it can hold no more salt in solution, and immediately then the salt becomes thrown on the surface of the boiler, precipitated in the solid form, and adheres; there is an affinity between the metal of the boiler, especially at that high temperature, and the salt, and it clings to the surface of the boiler, makes a solid wall round about it, a thick lining of this deposit, which has the effect of intercepting the heat of the fire; that heat which ought to fuse through the water, remains in the metal of the boiler; and if this incrustation be allowed to collect to any considerable thickness, the metal will be liable to be made red hot, to soften and to have cracks in it and the boiler to be gradually destroyed. Now this is the main evil that is to be guarded against and many ways have been suggested from time to time by different projectors of remedying this evil.

1588. In reference to the deposit in boilers, are you aware that there is a very great difference in the quantity of saline matter contained in the water of the Indian Ocean and the water of the Red Sea?—I have not seen any analysis of this, but I should hardly expect a very great difference, as far as regards the muriate of soda.

1589. And lime?—Lime is a very small portion in any sea water; I can give the precise proportions if you wish it the next day, but the fact is, the muriate of soda, constitutes the great bulk of the deposit; there is a little lime and a little sulphate of soda, and a little magnesia, but these exist in extremely small proportions; it is quite true that the lime, as far as it does exist, is the most mischievous; it lays hold of the boiler more tenaciously; it gives consistency and solidity to the muriate of soda, forming an incrustation instead of a loose deposit; but I should hardly expect it would have any very material effect from any difference of proportion that could subsist between sea water in one place and sea water in another place.

1590. Are you aware the officers of the Hugh Lindsay have reported that in consequence of the very great difference which existed in the deposits in the two seas, that they were under the necessity of blowing off their steam much more frequently while performing the passage of the Red Sea than of the Indian Ocean, which, of course, must lead to very great delay, and very great expenditure of fuel?—I have heard that such a report was made, but I did not attach much importance to it. The fresh water will have more lime.

1591. Are there any remedies that you could suggest for obviating the evils that you speak of in steam boilers?—There are the ordinary remedies which have been tried, and I can scarcely say that any of them are perfectly effectual; by far the most common one is this: what is called the process of blowing out, which consists in expelling the super-salted water from the boiler, and the introduction of ordinary sea water in its place. If this process were conducted with regularity and effect, the water in the boiler ought never to be allowed to be a saturated solution, you should continually introduce such quantities of sea water as would drive out the water before saturation: but to this there are objections; there is the immense loss of fuel from continually cooling the water in the boiler; you are driving out water at a high temperature, and letting in water at the common temperature of the sea. The consequence is that you are purchasing a clean boiler at the expense of a considerable waste of fuel. Then the process, if conducted otherwise, is, you allow the deposit to collect to a certain extent, it is blown out and mixed with the water. Now although this process has been enforced as far as it is possible for the owner of the vessel to enforce it, still, notwithstanding, incrustation is found to collect; I have taken myself off the interior of boilers incrustation two inches thick from boilers in which this process was enforced as rigorously as it was practicable to enforce it; for I ought to observe, that is a process extremely difficult to get regularly executed; the engine men feel that they are impairing, crippling the rate of the vessel every time they do it, and they have a natural reluctance to do it. Now another of the remedies next to that blowing out, which has been suggested, as the substitution of copper boilers for iron boilers; it is found that the salt which collects on the surface of the iron boilers is less liable to collect upon them; some will tell you it does not collect at all, and that they remain perfectly clear, and nothing but loose deposit is collected, and that that loose deposit may be blown away without harm: but I know that that is not the case, that an incrustation does collect on the surface of the copper, though not in the same degree as on the surface of iron boilers. Now I will give you an example: I have got here a tube, three inches in diameter, which I took out of a topper boiler at Hull. This tube was taken from a marine boiler which has been two years in operation between Hull and Hamburgh, and the owner of this vessel assured me that the process of blowing out was observed as rigorously as it was in his power to enforce it, and he asserted his belief that it was fairly executed. Notwithstanding that this tube is completely stopped, it is not a crust that is collected on it, but it is actually choked by a deposit as hard as marble. Then another remedy which has been proposed for this evil, and which is now in process of trial is an expedient which is known by the name of Hall's condensers. The source of the evil, as I have explained to the Committee, arises from our being compelled to work with sea water; if any expedient could enable us to work with fresh water, still more with distilled water, it is obvious, that the evil would be perfectly removed; and the object of the contrivance to which I now allude has been to enable us to do this, to work always with the same water, and therefore, always with perfectly pure water. Now the Committee will probably be better able to estimate the efficiency and merit, or rather the probability of efficiency in this contrivance, if I state to them it is not a new one. The celebrated Watt, at a very early epoch in the history of his discovery in steam, and even before steam was intended to be applied to navigation, constructed a condenser of this kind; he conducted the steam as it was drawn off from the cylinder through a multitude of small tubes which small tubes were carried through a vessel which was constantly supplied with cold water; the steam, divided into thirds, and compelled to pass through those tubes exposed to the effusion of cold water, was of course condensed. Mr. Watt tried this, he laid a drawing of it before Parliament, which drawing is now in the possession of his son James Watt, and I have seen it, signed by authorities indicating as having been before Parliament. This condenser is in fact Hall's condenser. I have read manuscripts of Mr. Watt's on the subject, and I find it was abandoned by him in consequene of his finding, first, that he never could make a vacuum sufficiently sudden and perfect by it; and, seccondly because the tubes *constantly got furred over, so that a fur collected on them, intercepting the cold water just as* the crust intercepts the heat in the other case, and in fact it was abandoned by him at that time as a hopeless thing. Mr. Hall, of Nottingham, has revived it, and has taken out a patent for its application to nautical engines. for the purpose of preventing incrustation; it is exactly the same as Mr. Watt's It consists of a number of small copper tubes through which the steam is compelled to pass, and it escapes from the cylinder, and which tubes are exposed to the cold water exactly in the same way, and the condensation is effected in that way; when the steam is condensed it is passed through a forcing pump, and it is driven back again into the boiler. The waste which must take place in this case, which will be more or less of this leak getting away, one way or another,—he replaces the waste by a small still in which he distills sea water, which could easily be done if there was no other objection to the contrivance. Now these condensers have been constructed in a great number of private vessels. I have seen them in vessels in almost all the ports in England, and I have examined them myself personally, but it is not by merely looking at such things, nor merely seeing them working, nor by examining the barometer, nor by any mere inspection of the machinery, that a correct conclusion can be obtained about them; it is only by a careful examination of logs fairly kept, giving an account of the state of the barometer gauge, the period of time. It is from this, and from this only, that correct conclusions can be deduced; one of the short ways of arriving at a conclusion certainly would be the examination of the barometer gauge; the question that would present itself to any one conversant with the subject would be, does this mode of condensation really produce a vacuum on the other side of the piston, does it really give mechanical effect to the steam by destroying the resistance on the other side; now most unquestionably, the gauges in those engines do indicate a very superior vacuum, no doubt of it, they indicate a very superior vacuum.

1592. Will you state what the indication is?—They indicate a vacuum very nearly equal to the barometric vacuum. Now, this however, is attended with a circumstance to which I wish very particularly to point the attention of the Committee. There is an appendage to the condenser of the common steam engine, called an air pump; the object of this instrument is to pump away the cold water which is introduced into that common condenser, to pump away that cold water and clear the condenser of it; but the purpose from which it derives its name is to pump away atmospheric air, a permanent elastic fluid which enters with the cold water which is introduced to condense the steam: cold water in the common state always contains a certain quantity of atmospheric air combined with it, and it is to get rid of this mischievous fluid that the air pump is mainly there. Now that is the use of the air pump in the common steam engine. In Hall's condensers he has no jet, he introduces no cold water to condense the steam, he consequently introduces no air to be pumped away, and therefore there is nothing remains to be removed from his condensers, except the pure water resulting from the condensation of the steam, and to remove that, it is obvious that extremely small pumping ought to be sufficient. Notwithstanding that, Mr. Hall thinks it necessary, for the proper efficiency of his engines, not only to use as large an air pump as is used in the common condensing engine by jet, but he even advocates the use of a larger. If then there be attached to an engine where there is no air to be pumped away, while there is no condensiug water to be pumped away where there is nothing but the mere condensing steam to be pumped away—if there be attached to that an enormous air pump, there is no wonder at all that there should be a good vacuum kept up; for you can keep up a vacuum without a condenser at all, if you give us a sufficiently large air pump. That, therefore, the barometer gauge in those vessels in which Hall's condensers are used should show a very high vacuum with so extensive an air pump in them, is not at all surprising, and in my opinion indicates nothing.

1593. Have you any reason to know that the air pumps used in those vessels where Hall's condensers are applied, are larger than the air pumps which would be used in the case of common condensers? —Mr. Hall told me himself that they are as large, and he even said that he would wish them to be larger; but I contend that they ought not to be there at all; I contend that there ought to be no air pump, but only a pump to pump away the condensed steam. And that if there be an air pump there of considerable size, either as large or nearly as the air pump of a common steam engine, I say that that air pump is in fact producing the vacuum, which is not produced by the condensers, and that the whole thing is a juggle. It is quite clear, that if you spend your power in working your air pump, you are doing nothing, it is just the same as if you were taking money out of one breeches pocket and putting it into the other; you are doing nothing at all, it makes no difference.

1594. Then how can you reconcile this opinion with the declarations that have been made by different persons who have been in those steam vessels for a long period, and who have declared that there is not only an increase of power in the same engines, but, merely with the addition of Hall's condensers, there is also a saving in the consumption of fuel, to the extent of one-fourth?—I have heard that and I have heard the contrary. I do not wish to be understood as offering these observations with a view to condemn Hall's as a bad principle; it may be a good one for anything I know; but I offer them merely as grounds for throwing a doubt for the present upon the thing, until we see it more extensively tried. I should even go so far as to recommend the adoption of Hall's condensers in the vessels at this side of Egypt, because they are always within reach of repairs, and if any difficulty should arise, they are in the nighbourhood of relief. But we ought to be extremely cautious in introducing novelties in the vessels on the Asiatic side of Egypt.

1595. But your opinion is that if it should be demonstrated by a lengthened trial of any vessel or vessels, fitted with Hall's condensers, it is an improvement of so much importance that it ought to be applied to vessels, and to those particularly now building, where long voyages were to be made by such vessels?—I think it very material, and if I had an opportunity of examining the performance of a vessel with Hall's condensers for a period of a year, average in circumstances of weather, and that I had a good log of that vessel, I would myself then form a judgment of it.

1596. Are you aware that Captain Wright, who commands the Prince Llewellyn steam packet, on board which Hall's condensers have been in operation for a considerable length of time, has reported most favourably of their action ?—Yes; I am aware that reports have been made by him, also by Messrs. Lloyd & Kingston. I have also had many favourable reports from private quarters, where they have been used, and I have had unfavourable reports. I have heard of instances where they have been introduced into a vessel, and taken out again, and this on the other hand has been accounted for by other motives.

1597. Are you aware that Mr. Fox has reported to the Lords Commissioners of the Admiralty that he has worked an engine with Mr. Hall's patent condensers for upwards of three years, and that he finds in it a considerable increase of power and saving of fuel ?—I am. I have met with several reports of the same kind from different other persons for other lengths of time.

1598 Should you take that report to furnish good authority ?—*Quantum valeat*; it is a very vague, general thing; it rests entirely on the judgment of Captain Fox.

1599. Can you state the general advantages; you have already stated one advantage arising from Hall's condensers; can you state whether there are any other advantages which in your opinion should recommend those condensers to general adoption ?—No, I do not see any advantage beyond keeping the boiler clean, and thereby economizing fuel; of course there is the economy produced by that of the boiler, a saving in the wear and tear of a boiler; a boiler will last about three years, while with him it would last seven years at least; and I can also vouch for this, that the contrivance is efficient in doing that which it professes to do, namely, in keeping the boiler free from deposit; for I have seen water taken out of a boiler which had been six months in it, and it was perfectly free from all sediment or deposit.

1600. Then it is your opinion that the boiler being freed from that deposit, or the danger of that deposit, there must be necessarily greater economy in fuel ?—Decidedly.

1601. One must follow as a natural consequence from the other ?—Decidedly.

1602. It is stated also by Mr. Hall that the valves and pistons are better lubricated by his improvement than in the common way ?—He says so; I cannot vouch for the fact that they are so. It is an extremely ingenious thing; but I do not think it is of the same importance as the other part of his invention.

1603. You do not apprehend any inconvenience arising from the mixture of the oil in small particles with the steam ?—It is apprehended that is one of the objections to his contrivance; that it is liable to that. The water will get gradually greasy; nevertheless, I must say that I have seen water taken out of a boiler which has been there six months, as I stated to you, and very little of that in it.

1604. It is also stated that that part of the boiler which is immediately above the water line is apt to become oxydized, and that the oil floating on the surface coats that part, and prevents oxydation, and the injury which the boiler would otherwise sustain ?—It is very likely that the floating grease would produce that effect. At the same time I never heard it complained of, that any injurious oxydation really takes place in boilers.

1605. Can you state the difference between Howard's principle and Hall's ?—They are quite different.

1606. Can you state the principle on which Howard proceeds ?—Yes, Howard's contrivance consists of getting rid of the boiler altogether; he has no boiler; the contrivance consists in making steam without boiling the water; in short, a quantity of quicksilver is placed in an iron pan over a coke fire, and kept at a temperature greatly above the temperature of boiling water. At a temperature something under the temperature of boiling mercury, a jet of water is injected on the surface of this hot quicksilver, which flashes into steam immediately upon contact with it. This steam, in a highly expanded state, is introduced into the cylinder, and works the piston in the usual way. It is re-converted into water by being passed through a worm, and returns to the vessel from which the jet is admitted to the quicksilver. of course, as there is no boiler there can be no incrustation, and the same water being used constantly over and over again, it must be distilled water.

1607. Are you aware whether any experiments worth mentioning have been made with regard to that plan of generating steam ?—It has been some years in process; experiments on one or two voyages of some length have been made, attended with favourable results, but also accompanied by unfavourable accidents, which have caused Government to decide upon abandoning further trial, and leaving it in the hands of the projector, the projector is now engaged in constructing vessels and making further experiments on a larger scale, but it has not attained to that point of certainty which would warrant its adoption even on this side of Egypt, and much less on the Asiatic side.

1608. Have you made any inquiries, or can you speak with any certainty as to the probable cost of coal in the different ports of India, and also in the ports in the Red Sea which are proposed for depots ?—It is extremely difficult to say what the cost will be for the quantity that will be required: if the quantity of coal which ships can take out in ballast be sufficient for working the line of vessels, coal may be had at a moderate price in India; but if more coal is necessary than the ships can take out in ballast, and if ships must be freighted with coal expressly, and probably have to come back in ballast, then that additional portion of coal will of course cost a higher price. I am not acquainted with the amount of tonnage which now goes out in ballast, and therefore I am not able to say what the cost would be under such circumstances. But from the best information which I have been able to procure, the nearest approximation I can make to it is, I should say, that in India coal might probably be obtained for from 35 *s.* to 40 *s.* and in the Red Sea from 60 *s.* to 70 *s.*

1609. You have I think stated in your work, that the highest price of coal in the Red Sea would be 60 *s.* ?—Sixty shillings; yes, I think that is it. That is supposing it to go round.

1610. Do you still adhere to that opinion ?—I am inclined to adhere to that opinion.

1611. Do you think it could be had at a cheaper rate, transferred from this country to Suez, across the Desert ?—It could not be transferred without a rail road I think at all; on the backs of camels I should think it would be very difficult indeed to transfer it. If a railroad were made from Cairo to Suez, it might be brought in boats up the Nile to Cairo, and might be sent by railroad across to Suez at a very moderate expense; then that would greatly affect indeed the price, and that is the only point of view in which I conceive a railroad would be desirable there.

1612. But until the establishment of a railroad, you do not consider it could be transferred?—I hardly see how it is possible that coal could be got across in that way, at any reasonable rate.

1613. Looking to the different sorts of coal which are to be obtained in this country, do you attribute great superiority to the Llangenich coal over other coals?—It is a stronger coal, certainly, and a given weight of it will produce a greater quantity of steam in a certain proportion than the coal of the north of England. But this advantage has been greatly exaggerated, and it has been kept out of view, that it is attended with corresponding disadvantages of a very serious kind. One of these disadvantages is, that the small coal is utterly useless; and that is obviously of greater moment when you have to send the coal round half the globe, liable to all the circumstances of transhipment, and lodging and lying in different places, and consequently to the production of a greater quantity of small coal. It is also, I apprehend,—though perhaps this may not be a very serious objection,—it is more liable to spontaneous combustion.

1614. Therefore you think that other descriptions of coal may be used with as great advantage as the Llangenich coal?—Most decidedly; but the difference is never worth consideration when a question of convenience in export is to be considered.

1615. And, therefore, that from whatever ports vessels take coal in ballast, the description of coal they will take will be sufficient?—Amply sufficient for all the purposes of the east. The fact is the runs which we contemplate are so far removed from the extreme power of the vessels to run, that the difference between one coal and another coal never can be a matter of any very great moment.

1616. Considering the greater degree of heat which prevails in the east, do you not consider that it would be advisable, in this point of view, to have a constant change of vessels as well as engineers; do you suppose that the engineers and the stokers could do as much duty in those climates as they are in the habit of doing in coal works in this country?—Certainly not; and I have taken that into account in the estimates which I have given in the pamphlet I have published on the subject. I have allowed eight stokers, I think, to a vessel, and two engineers; no, I have allowed three engineers in the establishment for a steamer in the east. A first, second, and third engineer at salaries, the first at 300*l.* a year, the second 200*l.* a year, and the third at 150*l.* a year. I have been mainly influenced in these recommendations by the consideration of how important it is to have a great quantity of mechanical skill at such a distance from the means of repair as that will be; and I have recommended eight stokers, which is an unusual complement of that class of men, partly in consequence of the heat of the climate, and also in consequence of another circumstance, which I would wish specially to impress on the attention of the Committee, namely that the economy of fuel depends, in a very great degree indeed, upon the attention and skill in stoking; according to the way in which the fires will be stoked you may produce a saving of fuel fully to amount from 20 to 25 per cent.; if the coals are shovelled in in an enormous quantity and the fire places choked with them, the door then shut up, and the men sit down to rest, the consequence will be that you will produce a prodigious smoke from the chimney, a great volume of black smoke, the fire is impeded for the moment, and your coals will be wasted. If, on the other hand, you stoke your fires in the manner that smoke-consuming furnaces are stoked, by laying in coal gradually, and in small quantities, on the front of the grate, and as it reddens shove it back towards the back, you will have no smoke from the chimney; it will consume all your coals, you will gain from them the greatest quantity of heat which can be obtained in that kind of furnace, and the result will be a saving according to the care and skill with which this is executed, from 20 to 25 per cent. of your fuel. Now this can only be accomplished by selecting good stokers, paying them well and not overworking them; but while they are stoking, make them stoke; let them have an abundant quantity of rest, but while they are in the stoking room, keep them constantly at work. It is found in the admiralty vessels that the judicious selection of stokers, and the enforcing of a rigid duty from them, has produced a most material effect in the economy of fuel; and I would also strongly impress upon the Committee the expediency of insisting upon the captains of the vessels knowing something of the mechanical part. It is utterly in vain to think of managing these vessels so far from Europe as they will be, if the captain is the slave of his engineer, and he always will be the slave of his engineer if he is not himself acquainted with details of the engine. It will be quite essential.

1617. In the event of the application in the vessels proposed to be built of Hall's condensers, do not you look upon it as a great advantage, the possibility of keeping the water at equal heat in the boiler, so as to save the necessity of that close attention on the part of the engineers and the attendants which would be otherwise required?—Yes; it would be an advantage, but that can be obtained by the common boilers, by making them feed themselves, by float gauges and other apparatus, that have been supplied just as well with other boilers as with Mr. Hall's.

1618. Does not it very often happen, that float gauges or any other modes which are adopted for that purpose, are found to fail?—Not except through gross neglect on the part of those who manage the vessel or the machinery of it.

1619. If you draw off the pressure suddenly, which may be the case from different causes, do you find the water will suddenly boil up, and that there will be in consequence a sudden production of steam; in a case of that kind will not a float gauge be likely to deceive as to the heat of the water in the boiler?—I should recommend always the self-acting feeder to be used in connexion with the float, which will prevent the level of the water from subsiding below the proper point.

1620. Should you approve of wrought-iron boilers in preference to copper ones?—No; I should advise the copper boilers; though they are double the expense, yet they last a greater length of time, and the old materials are available for sale at a considerable price afterwards. That is, I would advise copper boilers if you do not find it expedient to adopt Hall's condensers, for it would be quite useless to go to that expence if you do.

1621. In the event of not using Hall's condensers, would you recommend the use of copper boilers in preference to the iron ones?—Yes.

1622. Do you apprehend that there would be less liability to explosion or accident from the use of those boilers?—I think they would be more or less liable to explode, and if the boiler burst it would be attended with less danger.

1623. Is it your opinion, that explosion may take place in wrought-iron boilers by a combination of oxygen and hydrogen, the decomposition producing those gases?—I am inclined to think that explosion could not happen from that cause.

1624. Therefore you do not contemplate any case in which an explosion from the mixture of the gases and their explosive proportions could happen?—I am sure it could not happen.

1625. Do you think it would be advisable to apply any improvements of the paddle wheels that have been lately effected; for instance those of Mr. William Morgan?—I admit that the performance of vessels having Morgan's paddle wheels, is better in a considerable proportion than with the common paddle wheels; that the same quantity of fuel will carry the vessel further with Morgan's than with the common paddle wheels; but I think that their mechanical complexity is such, that if any accident happened to them in the Indian seas, which would disable the vessel, they could not be repaired with any skill or means which would be available in such a place; and I think that though that accident may not be very likely, still the liability to it forms a serious objection to adopting them on the Asiatic side of Egypt. I would recommend their adoption in the steam ships on the European side. There is another form of paddle wheel differing from the common one, and which I believe will prove to be more efficient than the common one, which is less subject to this objection. It is called the split paddle; the paddle board, instead of being one uniform flat surface, is split into a number of narrow leaves placed one beside another, not every unlike the position of the plates in a Venetian blind. We have not had this used as extensively in practice as Morgan's wheel, and therefore have not that practical evidence of its advantage which we have of Morgan's wheel; but looking at it theoretically, I should say it promises to be attended with advantages over the common paddle wheel, and it has this great advantage, that it is equally simple, that the fracture of one of the paddle boards would be as easily repaired in that as it would in the common paddle wheel, and in some respects, perhaps, easier; and I think, therefore it is worth consideration, whether it might not be advisable to adopt these split paddles.

1626. In giving this opinion, you of course contemplate the necessity of shipping and unshipping the paddles?—No; I fear that would be attended with very great difficulty, the shipping and unshipping the paddles: the Medea, to which I have so often referred, is remarkable for combining good sailing qualities with good steaming qualities, but the Medea does not unship her paddles; the Medea sails with her paddles in the usual place.

1627. She has Morgan's paddle wheels, has she not?—She has.

1628. Then you do not think it would be advisable to disturb the paddles?—If you could contrive a means of unshipping the paddles, I think it might be advisable to unship them in the south-west monsoon, when you are going the outward passage; but as yet I have seen no means of unshipping them which is not attended with such objections as to make it more advisable to leave them in their fixed position; it is of the very last degree of importance that when the paddles are in action they should be in the most stable, and firm and strong position, and therefore, any means of unshipping them must be a means compatible with restoring them to their position with that degree of stability and strength which one can scarcely imagine to be matter of temporary adjustment, alterable at pleasure at sea.

1629. Do you think it expedient that there should be a connection between the present establishment of Mediterranean packets and the Indian one, or that there should be separate establishments?—I think there ought to be a separate establishment; if the Indian line of communication be successful it will support a separate establishment, and if unsuccessful it will be likely to be discontinued, so that in any case I think the question of Mediterranean steamers may be put out of view.

1630. Are there any other reasons that you have to assign why it would not be advisable to employ the present Mediterranean steamers?—You must observe the reason is the interruption that it would occasion to the line of communication, and the delay. A steamer arriving from India at Suez, and sending her passengers, and her despatches and her cargo to Alexandria, arrives at Alexandria; we will suppose that a steamer, plying between Malta and Alexandria, meets her there, is ready for, and takes her to Malta; she arrives at Malta at a time when, probably, it is a few days after the Malta steamer has gone, the passengers have, in consequence, to wait at Malta for a month before they will have another opportunity of going on, and the same may be said of the despatches.

1631. And with regard to quarantine, does any objection present itself to you?—By the present rules of quarantine, if they go to Malta, they must stay there. They can come on if they please to Falmouth, and perform quarantine off Falmouth, but if they go to Malta at all, they must, with the present regulations at least, stop there, and the consequences would be these, that the passengers and despatches must be separated, because they would not keep the despatches at Malta, and a means must be provided of sending on the despatches separate from the passengers.

1632. You think, therefore, it would be proper, under all circumstances, to perform quarantine at Falmouth in preference to Malta?—Decidedly I think it almost essential to the success of the enterprise, considering it as a passenger line.

1633. Should you recommend the steamers between Alexandria and Falmouth to be of the same size as those recommended for the eastern seas or of a diminished size?—When I first considered this question, I felt myself justified in recommending steamers of 800 tons burthen, to work between Alexandria and Falmouth, but when I consider the splendid establishment of steamers which have been lately organised by the French government, and the many temptations which would exist to passengers to go by various points of Europe and overland, I think that a smaller class of vessel, say from 600 to 700 tons burthen, and from 160 to 200-horse power, would probably be sufficient for the line between Alexandria and Falmouth. This, however, is matter of minor importance in the present case, because, whatever arrangements might be made between Alexandria and Falmouth, would be changeable from time to time according to ciscumstances with the greatest ease, because one vessel could be put on when another arrived, from the abundance which will always exist on this side of Egypt.

1634. Have you any reason to know that the French steamers make greater way than English steamers of the same size?—I have no reason to know it.

1635. Can you form any opinion, or have you turned your attention to the expediency of sending correspondence from England to India by Marseilles?—If efficient steamers are established between Alexandria and Falmouth, I hardly think that any thing would be gained worth separating the despatches from the passengers by sending them across Europe.

1636. *You do not think it would be important for the mails to gain a certain number of days* —I do not think they would gain it; I think it would be important to gain it if they could, but I do not think they would.

[Adjourned till Monday next, at 12 o'clock.

Lunæ, 10th die Julii, 1837.

MEMBERS PRESENT.

Mr. David Barclay.
Lord William Bentinck.
Sir John Hobhouse.
Mr. Hutt
Mr. Mullins.

LORD WILLIAM BENTINCK, in the Chair.

Captain Mackenzie, called in; and Examined.

1636. *Chairman.*] YOU belong to the Bengal cavalry?—I do.

1637. When did you leave India?—I left India in December 1835.

1638. How did you come from India; by what route did you come from India?—I came in a native Indian vessel from Calcutta, up the Red Sea, through Egypt.

1639. At what season?—I came in the north-east monsoon, during the months of December, January, February and March.

1640. Did you come with your family?—I came with my wife and one child four or five years of age.

1641. Where did you stop during the passage?—We touched at Cochin, on the Malabar coast, and afterwards at Mocha and Jeddah.

1642. What winds prevailed in the Red Sea during your passage?—When in the Gulf of Adan, immediately outside the Red Sea, we had the south-east wind blowing very strong, and the same south-east wind carried us up to within two degrees of Jeddah, where we met the north winds, and we were obliged to beat up against them, and at last we got into Jeddah harbour. I think the south-east monsoon very seldom extends much higher than the 16th or 17th parallel of north latitude, after that you are subject to northerly winds.

1643. After leaving Jeddah, what then?—I stayed at Jeddah about three weeks waiting for a ship and afterwards went up to Cosseir.

1644. In what?—In the same native vessel, which got a freight from the Pacha of Egypt, to bring down troops and stores for his army in Arabia.

1645. How long were you doing that?—We were seven days between Jeddah and Cosseir, beating up against the north wind and calms the whole way.

1645* Then the north wind was not violent?—It was only violent for the first day.

1646. From Cosseir where did you go?—From Cosseir we crossed the Desert to Thebes, in five days.

1647. Had you any difficulty in making that trip?—None whatever. I had made my arrangements in Calcutta. I had made up a tent at Calcutta, and a tuck-too van or litter.

1648. Was there plenty of water on the route?—We carried water from Calcutta, and we had Mocha water also with us, which is very good; we made tea of water of the wells of the Desert.

1649. Was it good water?—It was a little brackish or so, but it made very good tea, we thought.

1650. How long did you stay in Egypt?—I was in Egypt about two months and a half.

1651. What detained you there so long?—I was detained about five or six weeks at Alexandria in consequence of my wife's confinement.

1652 Did you meet with many officers in Egypt who had come from India?—I met a great many officers and mercantile gentlemen who had come from India.

1653. What might be the number of officers, civil and military?—There were, I should think, about 25, and five or six merchants, I should think.

1654. What was the opinion of those officers respecting the convenience of the route through Egypt?—They were of opinion it was quite practicable, indeed that it was perfectly easy, and they were highly delighted with their trip, and much pleased with the ruins of Egypt, and other objects of interest which they had seen both in Arabia and going down the Nile.

1655. And was it the general opinion that this would become a favourite route between India and Europe?—Decidedly; I never heard any objection to it stated of any kind; any person who has ever gone that route would never go round by the Cape of Good Hope.

1656. Were there other travellers in Egypt from Europe or from other parts of the world except England?—I met a French viscount and a Swedish captain of engineers and several Americans, and a good many Englishmen of fortune travelling for their pleasure.

1657. Did any of them express a desire to avail themselves of a steam communication to go to India —All that I had any conversation with on the subject, and I had conversation with several, both English and Americans, they stated that they were exceedingly anxious to go and see India; and one family in particular, an American family that I met at Thebes, said they would have gone in the Hugh Lindsay the next trip, were they not afraid of arriving at Bombay at the commencement of the rainy season, when they were afraid it would be impracticable to travel over land from Bombay to Calcutta, but if steam communication had been established between Egypt and Calcutta round Ceylon, that they would have had no hesitation in going.

1658. Now, of those officers that came to India, what proportion of them, as well as you can judge, intended to go to England by sea, and what proportion across the continent?—I take the number at 25 who came overland about the same time as I did; of these, I should say 20 went over to Sicily, and thence through Italy home, and that five went in the Falmouth packet direct to England.

1659. Are you enabled to give any opinion as to the comparative expense of a voyage coming by Egypt, and of a voyage out by the Cape of Good Hope?—I should think that the expense of a voyage up the Red Sea would be much less; if I might take my own case, I paid much less for my trip than I could have been able to get a passage for from Calcutta to England in a good sailing vessel round the Cape of Good Hope; but I came in country vessels, and they are much cheaper than I imagine steamers would be; but I should say, if the passage from Calcutta to Suez was made about 50 *l.* or 60*l.*, that an officer of moderate means might be able to reach England as cheaply as by the Cape of Good Hope, and that even if they could not do it so cheaply, that 90 out of 100 would prefer going that route, although a little more expensive, on account of the objects of interest which would attract their notice.

1660. Mr. *Barclay.*] And the saving of time probably?—And the saving of time also.

1661. *Chairman.*] You found in your own case it was cheaper to come by the Red Sea?—I did.

1662. Have you any objection to state the particulars?—Not the least; I went in a native Indian vessel, entirely manned by natives, though commanded by an European captain, and I paid for my passage for myself, my wife and child, and had an excellent poop-cabin, 800 rupees to Jeddah; I waited three weeks at Jeddah, and got into the same ship and went up to Cosseir in Egypt in her, and I gave 12 *l.* more for my passage, with the same cabin; I think from Calcutta to Geneva, including my expenses at Cairo and Alexandria, and staying in the Lazaretto in Malta, and staying many days at Naples and Florence, and other towns of Italy, that I reached Geneva with an outlay of rather more than 200 *l.*; I mention Geneva, because I got a remittance there from England, as my whole Indian finances were exhausted by the time I got there; there can be no mistake about that, for I had but a certain sum to take me from Calcutta, and I had spent that as I went along, and I knew what I took away with me.

1663. What would the voyage by sea have cost you round the Cape?—I do not think I could have got a comfortable cabin in a good ship, with a good commander, under 300 *l.*, in a common ship I might have got one for 250*l.*, I dare say.

1664. You were some time both in Mocha and Jeddah?—I was a few days at Mocha, and three weeks at Jeddah.

1665. How did they appear to you adapted for coal depôts?—I think Jeddah is admirably adapted for a coal depôt; a beautiful harbour, as smooth as a millpond when you are inside; there is very good anchorage, and it is very capacious; and Mocha, again, is an open roadstead, where the south-east monsoon blows with constant violence, but I do not think it ever blows in squalls or hurricanes there, so that the anchorage is comparatively safe, and if you should happen to break from your moorings, why you would only be driven out to sea, nine months in the year, for the other three months it blows in-shore; it is not certainly such a good depôt as Jeddah is, on that account.

1666. You did not stop at Camaran?—I did not stop at Camaran.

1667. Mr. *Mullins.*] Did you make any inquiries respecting it while you were on your passage?—Yes; I heard a great many opinions on the subject; I had a great deal of intercourse with naval officers on the Red Sea, and I think the general opinion was that Camaran was well adapted for a depôt, having a good harbour, though perhaps not a sufficient quantity of water over the bar at all times of the tide for large vessels, but they seemed to think quite sufficient for a steamer.

1668. *Chairman.*] Did you hear how far the Pacha of Egypt was favourable to steam navigation?—Yes; I had a good deal of intercourse during my stay at Alexandria, both with influential Turks and with British and foreign merchants there, and they were particularly well acquainted, several of them, with Mohamed Ali's sentiments, and seemed to think he was highly favourable to the establishment of a steam communication, and seemed to think he was equally anxious for it as the English themselves, because he imagined that the establishment of it would divert a certain portion of the trade from the route of the Cape of Good Hope to its ancient channel of the Red Sea, and that he would be a gainer by his revenue being increased, and by his putting a slight transit duty on the trade, and it would greatly add also to the political importance of his country; and another object of it would be, that it would tend to cement stronger alliance between Great Britain and Egypt.

1669. And the merchants that you saw there, did they entertain the same opinion, that commercial intercourse would be increased and benefited by it?—Decidedly; they look on the establishment of steam communication with as much interest as the people of India do, and they think it will greatly increase their trade and commerce; that it will bring many things from India to Egypt which do not come now, and many things from Arabia, such as coffee and senna; and they seemed also to think it would be the channel for the conveyance of the trade of Turkey to India and China.

1670. Were any other articles specified?—Valuable goods which can be compressed into a small space, such as silks, stuffs of India and China, and Cashmere shawls and precious stones; and they seemed to think that a good deal of indigo, which is a valuable commodity also, would eventually come that way, particuarly if that Prince establishes his railroad betwen Suez and Cairo.

1671. How far is the Pacha of Egypt in possession of both sides of the Red Sea; have you any information upon that point?—Yes: the Pacha of Egypt possesses the whole coast of the Red Sea from Suez, on the north, to Mocha, on the Arabian shore, on the south, and to Suakin, on the African shore; he has an army of about 20,000 men in Arabia, and the chief towns on both coasts are garrisoned by his troops, with a regular government establishment, civil and military; and from what I saw of those governors, and the different civil and military officers, on my route up to the Red Sea, I should say that they are highly favourable to the English and to English interests, and are most willing in every way to forward the cause of steam navigation, for the transit either of despatches or of British travellers. I received myself the greatest civility and attention from them, and had frequent audiences with them at most of the towns I stopped at.

1672. Then you consider the intercourse completely secure through Egypt, both by the Red Sea and over land? Quite so; I think perfectly secure.

1673. *Now, do you happen to know in what manner the Pacha removes his troops from the Nile to the Red Sea; by what route, and in what manner?—He sends them sometimes up the Nile in boats to* Gennah and across the Desert to Cosseir, where they are embarked in Arab buggaros, and in these they are conveyed to Yambo, Jeddah, Gonfodah, Mocha, &c.; others who have been in Syria, or who are in garrison at Alexandria and at Cairo, are sent across the Desert to Suez direct, the nearest route, and thence shipped in buggaros and go down the Red Sea, the same way as others do from Cosseir.

1674. Do they march across?—They march across.

1675. How are they supplied with water?—They generally carry Nile water in bags with them on camels. There is never the least difficulty about water: for culinary purposes they make use of the water of the Desert, and for drinking they carry Nile water, which is very sweet water, and will keep a long time.

1676. Had you any apprehension of the plague during your residence in Egypt?—No, I never had any great apprehension, although it was raging almost the whole time I was in Egypt. We first came upon it at the large town of Siout, the capital of Upper Egypt, beyond which limit it seldom extends; it has never been heard of at Thebes; and it accompanied us all the way down the river, on both banks, and the only precaution I ever took was, that when I got alongside of a boat containing the dead bodies of people who had died of the plague, which I did accidentally one day, when I got alongside of one with 17 plague bodies on board of it; they had come over for interment; they generally inter their bodies there in the Desert that they may not cut up the fertile cultivated soil; in fact, bodies during the inundation would be washed up if they did not bury them out of the reach of the inundation; the only precaution I took upon that occasion was to fumigate the boat well in case of anything happening, as I had the lady and a child on board, which made me more particular than I otherwise should have been; but during the whole time of my progress down the Nile from Siout to Alexandria, where the plague was raging, I never kept any quarantine; and I freely went into all the villages and among all the ruins to see all the celebrated sights; I have had several of my boatmen ill from fever, but none of them ever caught it, and we arrived in safety at Alexandria; and I believe if you are confident you will not catch the plague, and do not harbour any fears about it, you are not so likely to catch it as you would otherwise be.

1677. And on the part of the other officers you met there, was there any serious apprehension?—I do not think there was much apprehension; we are so much accustomed in India to violent epidemic disease, such as the cholera and those things, carrying off hundreds before our eyes, that we think less of it than other people.

1678. Then you do not think that the existence of the plague in India can be considered as a serious interruption to intercourse?—No, I do not.

1679. Can you speak as to the general desire of the civil and military officers in Bengal for the establishment of this steam communication?—Yes, I can speak confidently of the general feeling in its favour among the civil and military servants; they are most anxious to have it established, and indeed they have made great exertions, and several of them have subscribed considerable sums to forward the cause; I myself have subscribed twice for it.

1680. And do they wish it for the sake of the quicker correspondence, or for the sake of the passage home?—Partly for both; I think there is no doubt their first object is to secure a certain and rapid correspondence, but their second object is to avail themselves of a quicker passage to England.

1681. Mr. *Mullins.*] Do you think the rates charged by the Cape of Good Hope for passengers from this country to India ought to be persevered in, the charge for passengers from this country through the Mediterranean to India, or whether they should be raised or lowered?—I should think the community of India would bear to have them rather raised a little than otherwise, but they would willingly pay an extra sum of money for the facility and for the greater rapidity of transit; and I think they would pay the same, because they would be fully remunerated by the objects of interest which they would see in Egypt and on the continent of Europe.

1682. But the chief inducement, you think, would be the facility of communication?—That would be one, but I think the other also; it was a great inducement to me; I speak personally; I thought the seeing of those monuments of antiquity in foreign countries a great object, and it would be a great object with most Indian officers.

1683. Do you think it would be an inducement to those officers who are now in the habit of going to the Cape of Good Hope on a certain portion of their allowance to come to England by the Mediterranean, even though they should lose that allowance?—They can go now to the Cape of Good Hope, retaining their allowance; they can go to Egypt, also retaining their allowance; therefore I think that if the offer was made to them whether they would go on sick leave to the Cape of Good Hope to spend a year or two, or whether they would go to Egypt, they would say, "we will go to Egypt at once," because it is a far more interesting country, and a more delightful climate; and they can not only go to Egypt and wander about, but they can go to Syria, and I do not know whether they cannot even go to Constantinople.

1684. Do you think it would be advisable to make an arrangement by which they might continue their progress to England instead of remaining in Egypt, by diminishing still more the allowance which they at present receive by going to the Cape of Good Hope?—Do you mean that they now receive?

1685. Yes; if that allowance were still further diminished, should you think it advisable to permit them to come to England for a certain time, in place of remaining in Egypt, which at present they have it in their power to do ?—I think if they put them on English pay and English allowance, that every one of them would be induced to come to England instead of remaining either at the Cape of Good Hope or in Egypt; but it is the loss of allowance that induces them to stop at the Cape, or would induce others if steam communication were carried into effect to remain in Egypt.

1686. But even though there should be that loss of allowance, would not the facility of communication be an encouragement to those invalids to come to England in preference to staying in Egypt, even though they should lose their allowance ?—I think a great many more would come to England than do now, decidedly; but those who have staff appointments in India, either in the civil or in the military service, these are the people that do not like to sacrifice their appointments by making those who have no appointments or who merely belong to the regiment; these people would all prefer coming to England instead of staying either at Egypt or at the Cape of Good Hope.

1687. But you do not think the possibility of reaching England within a certain period after leaving India would be an encouragement to officers such as you describe, who have large allowances, to make a temporary sacrifice, for the purpose of seeing their friends at home ?—If it were only a temporary sacrifice they would all do it; but on leaving India, an officer who has an appointment forfeits that appointment, and therefore if he goes to England only for six months when he returns to India he must rejoin his regiment.

1688. Your opinion then is, that it would be matter of good policy to give the same privileges to Indian officers coming to England that they at present possess going to Egypt or the Cape of Good Hope?—With regard to retaining their appointments and allowances.

1689. And being reinstated on their return ?—There would be a good deal of objection on the part of the officers of the Indian army to such an arrangement, for this reason, that when an officer goes home, some candidate succeeds to the vacant appointment, and then it creates a greater falling in and a greater number of appointments, and if they were deprived of this, they would be inclined to grumble perhaps, although no doubt it would be for their own advantage, in my opinion, because there would be a greater number of acting appointments, a greater number of officers in staff situations; some have been 50 years nearly in staff situations, and never quitted them. These men would go home, and other people would be appointed to act in their room, and therefore it would, I conceive, be a great advantage to the Indian army if they were allowed to come home, retaining their appointments.

John Kingston, Esq., called in; and Examined.

1690. Mr. *Mullins*.] You are one of the engineers to the Admiralty ?—I am assistant engineer at the Woolwich yard.

1691. You, of course, from the nature of your duty, have been obliged to devote a great deal of attention to steam machinery, and its various improvements in steam vessels ?—Yes.

1692. How long have you been appointed to that office ?—I have been there 17 years, but not all the time performing the same duty.

1693. How long have you been performing the duty you now perform ?—About 12 years.

1694. In the course of your duties you have had occasion, under the orders of the Lords of the Admiralty, to examine different improvements in steam engines ?—Yes.

1695. I perceive that you and Mr. Lloyd have made a report to the Lords of the Admiralty, in the year 1834, with regard to Mr. Samual Hall's condensers ?—Yes, we did.

1696. You were directed, I believe, by the Lords of the Admiralty to go on board a vessel for that purpose ?—To make an experiment to Ramsgate and back.

1697. Will you have the goodness to state to the Committee what opinion you formed of that experiment ?—At that time I formed a good opinion, and I still hold it; but I understand it has been taken out of the vessel; I do not know from what cause. The only objection was, that the pipes were liable to choke.

1698. What pipes ?—The pipes forming the condensers; several vessles are furnished with them in Scotland, and I believe they answer well from what I hear there.

1699. Mr. *Barclay*.] In what way do they answer well ?—The saving of the boiler is the principal, to prevent any deposit from sea-water; no sea-water goes in the boiler, the water being continually used over and over again, is condensed.

1700. Mr. *Mullins*.] Will you state, for the information of the Committee, what the peculiar principle is, and how it is applied ?—At this moment I do not exactly recollect the form of it.

1701. But you can state generally what the principle is ?—It is a number of pipes, I forget how many there are in number, and the steam passes through those pipes; there is cold water, of course, round them continually; the steam is collected, afterwards condensed, thrown backs again into the boiler, and then it is re-used.

1702. So that there is a total impossibility of any deposit ?—Quite so.

1703. Or incrustation being formed in the boiler ?—Quite so; it cannot be, the time this water goes in the perfect state it does.

1704. When the water is first introduced it is distilled water ?—No, common water.

1705. Not containing any salt ?—No.

1706. And then it is distilled water which is introduced afterwards to keep up a supply ?—It is. There is only a small quantity; that will depend on the leaks. They take a very small quantity to sea with them to make up the defects.

1707. In your opinion, how much longer will a boiler last in which the principle of condensing by surface is applied than a boiler on the common principle, where there is a condensation by injection ?—I should venture to say three times as long, at any rate.

1708. Where those condensers are applied, what description of boiler would you use, copper or iron ? —I should say iron boilers.

1709. Do you think it would be necessary to construct the boiler of such large proportions when those condensers are used as under the common plan?—I should think it would require no difference as to size; I do not see why it should.

1710. Are you not aware that in the construction of the boilers in general use they make a certain allowance for the incrustation, and for the necessity of having a greater surface to obtain the requisite quantity of heat?—I have never understood that to be the case.

1711. With regard to the quantity of consumption of fuel, have you formed any opinion upon that subject when Hall's condensers are used?—There is a saving of fuel, I think, but it is principally the saving of the boiler.

1712. Are you aware that in your report to the Lords of the Admiralty, you decidedly stated there was a saving of fuel?—The saving of fuel must be taken in this way, when the boiler becomes so lined with this filth that it requires a great quantity of heat to generate the steam in sufficient quantities.

1713. But when it is evident that according to the old system there must be incrustations of boilers, and therefore an additional quantity of fuel, and when in the new system the boiler is kept perfectly clean, is it not your opinion that there must be a saving of fuel under the latter circumstances?—Quite so.

1714. There is also another reason why there would be a saving of fuel, which is the avoidance of the necessity of continual blowing off?—That is another point, certainly; there is no blowing off required. In the ommon boiler they blow off every two hours, with the injection condenser they blow off every two hours.

1715. When the new condensers are applied it is not necessary? No; you must not blow off.

1716. I believe you have found in the same way that many engineers who have devoted themselves to that subject, that in proportion as the incrustation or deposit in boilers increases, so does the quantity of fuel, used in a certain space of time, increase?—Certainly it does; I cannot speak exactly to what quantity it does increase, but I know there is a very great increase; at the expiration of two years the boilers require a great deal of fuel; there are some parts that you cannot get at to clean.

1717. So that in case of a vessel making a passage, of several days, you are aware it has been found that, at the termination of her passage, she consumes a much greater quantity of fuel than at the commencement?—Yes; and the rapid destruction of the boiler goes on in the first place.

1718. Mr. *Barclay*.] Are these condensers very much used now in the construction of new steam vessels?—We have one making, the Margara, for the service.

1719. But I mean the general service of the country?—Principally in Scotland; I have no knowledge of having them, except I think in three Scotch boats; the Prince Llewellyn is one.

1720. Mr. *Mullins*.] If you look at your report, you will see the St. George's Companies, every one of them, has them [*The Witness looked at the report*]? I was not aware there were so many as those.

1721. How many vessels are there stated there to be actually in action? There are eight vessels actually in action, and there are 21 vessels constructing upon that principle.

1722. And do you happen to know they are applied in a vessel going between this country and America, the British and American Steam Navigation Communication, Claud, Girdwood & Co., 460-horse power?—Yes, I heard of that.

1723. Did you pay particular attention to the action of the machinery during the passage to Ramsgate? As far as outward appearance would allow us to do so. The condenser was not opened for us to look at the internal part of it.

1724. Were you able to form any opinion as to the increase of speed?—We did not make any trial of that kind; although we passed our mile-mark we could not attend to it, in consequence of the passengers being on board; she was loaded with passengers; besides, to make a trial of that kind we should make a comparison.

1725. Do you think that a more perfect vacuum is preserved in those condensers—It appeared so by Mr Hall's statement; there was no barometer on.

1726. But you have always understood that the vacuum was better preserved in those condensers?—I have always understood so, and I believe it to be the case.

1727. You are aware that it is proposed to open a communication between this country and India; do you suppose that, for the long passage that the vessels would have to make on that route it would be advisable to apply those condensers?—I should have no fear to try one as an experiment, none whatever.

1728. Do you not suppose that the experiment has been sufficiently tried already where vessels have been fitted with those boilers, and have been working for a number of years, as in the case of the Hercules, for instance?—The Hercules has been working I think two years. I should rather try them a little farther first.

1729. Have you heard any report of the working of the engines of the Hercules?—I was to have attended a trial as much as six weeks ago, only I was ordereed off to another place. Mr. Ewart and his assistant tried the Hercules, but I have not heard their opinion upon the condensers at all.

1730. You are aware that those boilers do not require examination or cleaning for a very long period?—I have heard so; I have not seen it myself.

1731. Do you know anything of Morgan's paddle-wheels?—Yes.

1732. What is your opinion of those paddle-wheels for vessels which are intended to make long voyages?—I would not recommend them.

1733. Will you state your reasons?—The principle of the wheel is good, but they wear out so very fast that they would not run, I should suppose, more than from 22 months to two years without repairs. I have had a great deal to do with them; as much as any one.

1734. They have been tried in the vessels of the service, have they not?—We have several vessels fitted with them now. We took them from one vessel last week, the Tartara, I think; they had been in only 14 months, and they wanted thorough repair.

1735. And therefore your opinion is, that where it may be difficult to obtain those necessary repairs it would not be advisable to apply such a complicated system?—Just so; I am perfectly satisfied of that.

1736. And you do not know any other description of paddle-wheel in present use which it would be proper to recommend for such vessels?—We are making trial of Mr. Field's plan; Mr. Galloway claims it, but Mr. Field I know is making some excellent experimens,t and if it succeeds in sea as it does in still water, it will be the best wheel that was ever made or thought of.

1737. Describe the principle of it ?—It is a wheel, differing in no other way from the common wheel except that there is a double set of boards, not a plain rectangle, but the board is taken off, and it is brought as it were in a parallel position, with an interval between the edges; we have only two-thirds area of board on the wheel we are now trying, and there is an advantage in point of speed over the whole board; I cannot account for it; it will require some consideration.

1738. In those wheels you have just been describing, there is nothing so complicated in your opinion as to prevent their being applied, in case they should be found to answer, as well in rough water as in smooth ?—Nothing to prevent them whatever; they are simple, durable, and possess all advantages if they should succeed in the sea.

1739. I understood you to state you are making those experiments under the orders of the Lords of the Admiralty ?—We are; we have made 16; to-day is the 17th; I have only been present at four, because I have been to Scotland.

1740. You of course have examied the different sizes and proportions of vessels for the different situations on which they may be placed ?—Yes.

1741. Is it your opinion that in the case of vessels intended for making long voyages and encountering hard weather it would be advisable to have a large tonnage and great horse power, or to limit it to such a size as that of the Atalanta or the Berenice ?—I think vessels from 450 to 600 tons is about the size that I should recommend; not larger than 600 tons.

1742. Will you state your reasons for limiting the size of vessels to that particular tonnage ?—I think they would be more suitable for the distance they have to run.

1743. Are you aware of the distance they would have to run ?—I should suppose not more than eight or nine days each.

1744. Do you think a vessel of that size, with a proportionate horse power, could weather a gale better than a vessel of a larger tonnage and a greater horse power ?—I think so.

1745. And is it opinion there will be as little wear and tear of the vessel, or straining of the vessel and of the machinery ?—I should think there would be less straining a vessel of that size than one of much larger dimensions, especially crossing a heavy sea.

1746. It is your opinion that a vessel of that size could make any head-way against a heavy sea ?—With plenty of power; I would not confine her to power.

1747. What proportion of power would you give a vessel of 600 tons ?—I would not give her less than 270 horse power; from 260 to 270; not less.

1748. Are you not aware that if you put more than a certain horse power into a vessel of certain tonnage, that in attempting to make head-way against a heavy sea, she would actually strain herself under the water, and that consequently that additional horse power would be useless to her, inasmuch as she could not use it ?—I think that would depend, in a great measure, upon the form of the vessel.

1749. Can you conceive any form of vessel, or do you know any vessel having such a form as to enable her to use that horse power, or that proportion of horse power that you describe, without incurring such danger as I mentioned, if put to her speed ?—The Unicorn, that runs from Liverpool to Glasgow, has similar power, as near as possible, to the tonnage of the vessel; she has 240-horse power, and I think she is not more than 250 tons; and I examined a vessel, called the ———, which the Government have bought lately. She has engines 290-horse power, and her tonnage is 562 by the old measurement, and by the new rules 711 and some odd fraction.

1750. Do you know of any other instance besides those you have mentioned ?—The Eagle is a similar vessel to the Unicorn; the power is the same. I think, in a great measure, it depends on the form; but whether or not, if you have an excess of power in a vessel, you have no occasion to make use of it unless you please; you may reduce your power as much as you please. It is best to have it, because in quiet, still weather, you have all the advantages, and those advantages tend to the saving of fuel.

1751. Looking to the increase of weight which must necessarily attend an increase of power in the engines, do you think any advantage to be gained will not be counterbalanced by many disadvantages, such as the displacement of a certain number of tons of cargo ?—The engines will take a little more room than engines of less power, say 40 horse less.

1752. But then there are the boilers ?—The boiler is the only thing, but that is no great deal; two feet in a boiler is not a great deal, you would have the advantage of your power when circumstances would allow it.

1753. There would be some additional space taken up by the boilers and the machinery ?—But the extra power would be available in fair weather.

1754. You are aware that vessels of 1,000 tons and 250-horse power have been recommended by Dr. Lardner, and different other gentlemen, and why is it do you think there will be any advantage arising from the employment of vessels of such a size in preference to those you have spoken of ?—I should not think there would be any advantage at all, but a very great drawback.

1755. You are aware that those vessels are proposed to carry passengers, and also to carry a certain number of tons of cargo; do you suppose that in a vessel, such as you describe (a vessel of 600 tons), there could be sufficient accommodation for a number of passengers, and also to have spare room for a cargo, consistently with the quantity of fuel which it would be necessary to take for a long voyage ?—That is to say, for nine days; I believe that is the longest.

1756. But then you must allow for accidents ?—We always have an excess of two days, eleven days for nine days; I think you might conveniently stow about 60 passengers abaft.

1757. With perfect accommodation and comfort ?—Yes, I do; and 25 forward.

758. What space could be spared for the general cargo over and above the quantity of luggage that belong to the passengers ?—There would not be a great deal of room I think for cargo, but I cannot speak positively to that; I will, however, if the Committee wish it, make the best calculation I can upon that subject and furnish the Committee with it. [*The Witness was requested to do so.*]

Adjourned till To-morrow, at Twelve o'clock.

Martis, 11th die Julii, 1837.

MEMBERS PRESENT.

Mr. David Barclay.
Lord William Bentinck.
Sir John Hobhouse.
Mr. Hutt.
Mr. Mullins.

LORD WILLIAM BENTINCK, in the Chair.

Captain Robert Oliver, r. n., called in; and Examined.

1759. *Chairman.*] Do you belong to Her Majesty's Navy?—I do.

1760. What rank do you hold in Her Majesty's Navy?—Captain.

1761. How long have you been a captain?—Commander and captain near 10 years.

1762. You have been during the time in command of steamers, have you not?—I have been for the last six years attached to the steamers. I commanded the Dee and the Phœnix, and was interested in other vessels.

1763. What are the power and tonnage of the Dee and the Phœnix?—The Dee is 704 tons, and 200-horse power; the Phœnix is 809 tons, and 220-horse power, the same as the other large class; that is the maximum power afloat at present; the same as the Salamander, the Rhadamanthus and Medea.

1764. Do you consider that proportion of power equal to the tonnage, or that it would be better if it was increased?—It depends entirely upon the purpose for which it is employed; in large vessels the power is not increased in the same ration with the tonnage.

1765. That is to say, a greater tonnage requires less power in proportion?—Yes; we find that the large vessels make better progress with smaller power than smaller vessels do, from their own gravity.

1766. Dr. Lardner, the other day, informed the Committee that the larger the vessel, the more easy it was to overcome resistance; you agree in that opinion?—Perfectly.

1767. He gave that as his opinion, and he referred particularly to the Medea, that a vessel of 1,000 tons, intended for a lengthened steam navigation, would do better, upon the average, with one-fourth of the power, that is, with 250-horse power, than if it was increased much beyond that?—I have found that to be so. My experience leads me to believe that to be the case.

1768. He gave this as a reason, that in smooth water the greater power would propel the vessel with greater speed; but if they have to overcome an adverse sea and bad weather, the larger the vessel the greater the speed?—Yes, from the gravity of the vessel; that I have found in my own experience. In commanding the Dee, for instance, of 200-horse power, and 704 tons; in the Phœnix, 809 tons, with only 20-horse more power, I could face the sea, and make progress much easier with that vessel; and I am perfectly satisfied that that principle is good throughout, that the larger the vessel the greater her capacity to resist both wind and sea, and a less engine is required to propel her.

1769. In India, where we have to contend with the south-west monsoon, that principle would be particularly applicable, would it not?—Quite so. I should recommend vessels of a larger class than are usually employed.

1770. What would you recommend, from your experience?—I should say, a vessel of from 900 to 1,000 tons; not less.

1771. With what power?—I would say, about four tons to a horse power; in vessels of a smaller description the load is equal, but she has less capability of bearing it; consequently, much power is lost in overcoming the resistance from immersion.

1772. Have you been off the coast of Spain?—I have been no further than Lisbon.

1773. Have you ever carried troops in a steamer?—Occasionally; not for any distance. The ship I commanded I was absent from at the time she carried troops to Ireland. I have had troops on board for short runs, and at anchor I have had a considerable number on board.

1774. Are any Government steamers fitted up for the express purpose of carrying troops?—There is only one for dock-yard purposes and conveying troops.

1775. What description of vessel is she?—She is about 700 tons, and 200-horse power, similar to the Dee

1776. Do you know what troops she will convey?—It depends entirely upon the season, distance, and the kind of weather; but in fine weather she would take 500 men upon her decks, with great ease, for 24 hours; and she would tow at the same time a transport with an equal number. I conceive one of those vessels would take a whole regiment, with a transport in tow, only to be limited by the fuel and provisions.

1777-8. It would be a great advantage to India, with our extensive coast, and an adverse monsoon one way or another, to have steamers that would convey bodies of troops from one point to another quickly; what description of vessel do you think would best attain that object?—The very largest class; the larger the greater the accommodation in proportion to the tonnage.

1779. Do you think the object would be attained by having the steamer work as a tug?—She might take a greater proportion herself; she might take 500 men upon her decks, with great ease, for many hours, depending entirely upon the weather.

1780. Supposing the troops were required to be carried several hundred miles, and to occupy six or seven days' passage?—There would be no difficulty in that.

1781. In India you would require that the troops should be protected from the sun?—We have no means of stowing them in our ships below; the accommodation below is very trifling. The engine room occupies so much of the space, there is not much accommodation for them below, but they must be protected by awnings.

1782. The steam vessel on the coast of Spain have been used entirely for purposes of war, not for conveying troops yet?—The Phœnix and Salamander took 1,200 men who were the means of turning the day; they made a breach, as I was assured by an officer present, where 200 men could walk in; that was effected by the Phœnix alone.

1783. Are you acquainted with the Medea?—Perfectly.

1784. She is made for sailing as well as steaming?—All the Queen's steam vessels are rigged to make a voyage entirely under sail; by disconnecting the wheels we save our fuel, and make as good voyages, with a free wind, as any sailing ship, provided the wind is not too light; then, if the wind is so light that she does not make her maximum speed under sail, we then apply a portion of the power, either by one wheel or two wheels, or one boiler or two boilers, economizing the fuel to the demand for speed.

1785. Has she a different construction for the purpose of adapting herself to the double service of sailing and steaming?—No; only the masting and rigging is in better proportion. Throughout the service an arrangement has been made, to adapt all steam vessels to make their passage under sail alone.

1786. The masts and yards are heavier than they would be in one of the Navigation Company's vessels, are they not?—Yes, they are on a very large scale in proportion, but not sufficient to cause too great a resistance; they are constructed on the principle of giving the greatest spread of canvas with the least possible resistance from the masts and yards. The topmast and yards, and everything comes down, and there is nothing but the lower masts offering resistance.

1787. Then the different rigging does not interfere with the power of the vessel as a steamer?—No: the Medea has been cruising for weeks together with a fleet, without ever getting her steam up; and she will, with a strong breeze, go 11 ½, equal to any ship in the fleet, when they come under double reefed topsails; and upon a wind, in fine weather, she will make eight knots an hour. We consider her sailing on a wind, in moderate weather, equal to that of the dullest ships; off the wind, so long as a large ship is compelled to reduce her sail, she comes on an equality with them.

1788. Mr. *Mullins.*] Have you any notion how many knots an hour the Medea makes when steaming, in average weather, at sea?—It depends a great deal upon her trim, whether she is very deep or very light.

1789. The question assumes that she is in good trim?—Then, in moderate weather, she would make nine and a half in smooth water.

1790. Take the case of the weather the vessel is accustomed to meet with at sea most parts of the year?—She averaged better than eight knots an hour in her passage from England to Malta.

1791. *Chairman.*] How many days' fuel will she carry?—She has carried 320 tons; they used great economy: much depends upon the mode of management.

1792. What does she consume per day?—About 18 tons a day, taking the average; she can carry 18 days' consumption with great ease.

1793. Mr. *Mullins.*] In a vessel carrying so many days' fuel, how many tons would be spared for a cargo, assuming her to take a cargo, without sinking her too much?—There would be very little room for a cargo.

1794. Assuming her to be carrying coals for 18 days, and the consumption to be 18 tons per day, what do you think would be the number of spare tons for cargo such a vessel could afford?—It would be about 72 tons; the only difference between the 12 days and the 16 or 18 days would be, her lines would be so deep, if she was lower it would be against her going.

1795. That tonnage, with a cargo, would not, in your opinion, throw her out of proper trim, or cause her to sink too deep?—She would be quite deep enough. It is the immersion of the vessel by which her speed is regulated; it is by immersing the ships in the way they do that they make such bad weather and little progress.

1796. Do you suppose a vessel will be immersed too much if she was to take that quantity of cargo you have just mentioned, in addition to the fuel necessary for 12 days?—Yes, too much for bad weather. The Medea, in addition to her full complement of coals, carries 120 men, with three months' provisions; her armament and ordnance stores are near 25 tons; all her duplicate engine gear, the weight of which I have not the means of giving, but which is very extensive, say 10 tons, and all other stores usual in vessels of war, which amount to a very large quantity.

1797. Is it your opinion, that with all those different armaments which a vessel prepared as a vessel of war must take, she still would take that quantity without being immersed too deeply to injure her working in bad weather?—That ship would perform her duty well, she has done it; but in extreme bad weather she would find an inconvenience.

1798. Assuming a vessel of 1,000 tons and 250-horse power to be confined exclusively to the conveyance of passengers and to the conveyance of a general cargo, assuming her also to take fuel sufficient for 12 days' steaming only, how much room, in your opinion, would she have for a general cargo?—Not much more than the other ships I have already mentioned of 200-horse power; in the same proportion.

1799. In what respect, under those circumstances, would a large vessel have an advantage over those you have been describing?—Her superior capacity gives her superior power, the larger the vessel the greater the capacity of carrying sail; in long voyages, the sail must assist very materially; those ships will make a four-point course good. When a vessel does not make more than five or six knots direct to to windward, it is better to put her under low canvas, when she will increase her speed one-third; and by working a traverse, she will arrive at her destination in nearly equal time; with the wind fair she is quite capable of making her passage with her wheels disconnected, thereby saving her fuel altogether. I have prepared a scale, which, with the permission of the Committee, I will put in.

[*The same was delivered in, and is as follows:*]

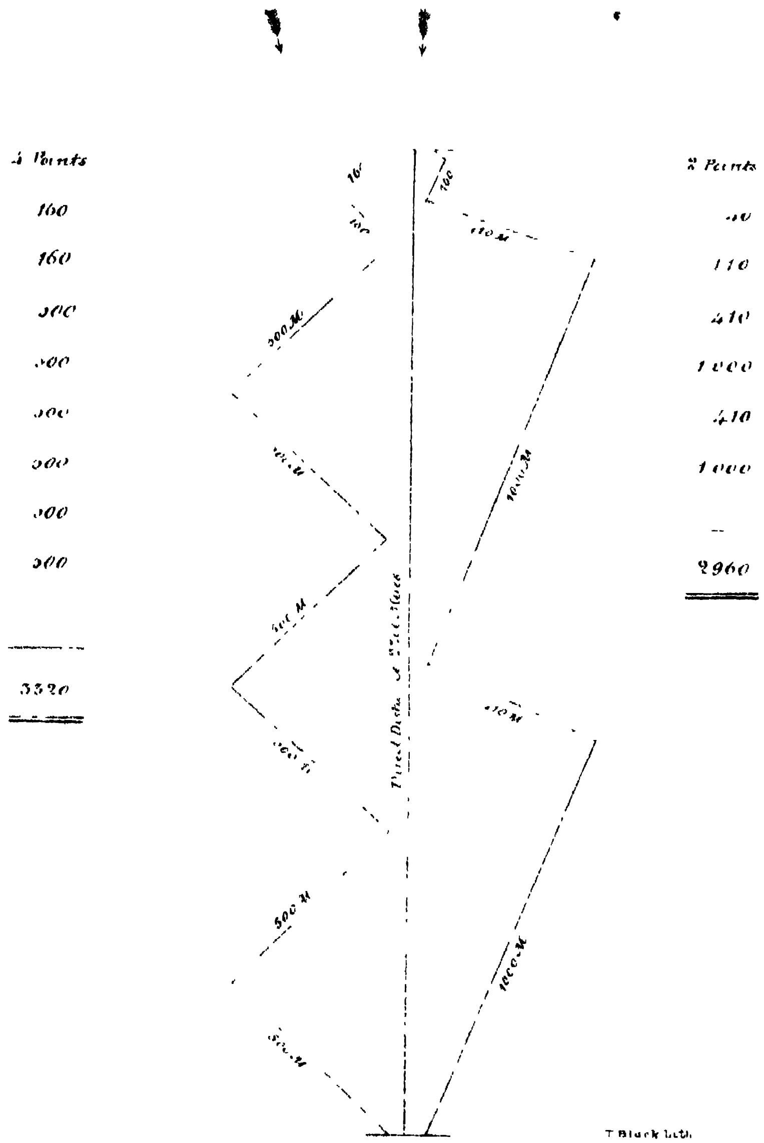
The accompanying Diagram shows the advantage of the efficient masting and use of sails, when the speed reduced to and below five knots from resistance of head sea and wind, it having been found with steam, and fore-and-aft sails, a four-point course can be made good with an increase of speed of from one-third and upwards, according to strength of sea; also, with the wind two points from the course by which the intermediate angles can be judged of.

The Table an approximation to loss or gain in time.

It is rare, indeed, in a long run, but the wind veers so as to enable a greater advantage to be taken of the use of sails, and thereby relieve the vessels and engines considerably.

With the wind free, the velocity obtained from the sails frequently exceeding that of the engines, by disconnecting the wheels, the expense of fuel, wear and tear of engines and boilers is entirely saved.

Maximum Distance yet made under Steam, at one time, without a stop:



T Black Lith.

Steam only:

knots. hours. knots. hours. knots. hours. knots. hours.

Direct distance .. .. 2,300 n. miles .... 5 in 460 .... 6 in 383 .... 7 in 328½.... 8 in 287

Steam and sail—Course of four points from direct line, the wind ahead:

Distance run .. .. 3,320 n. miles .... 7 in 474 .... 8 in 415 .... 9 in 368 .... 10 in 332

Course, the wind two points from the direct line:

Distance run .. .. 2,960. n. miles .... 7 in 423 ... 8 in 370 ... in 329 10 in 296

1800. Is it your opinion that the paddles could be unshipped occasionally, without any detriment to the strength of the machinery of the paddles by constant changing and re-changing?—We have two modes of proceeding, one to disconnect the wheel from the engine and allow it to revolve, the other to displace a portion of the boards.

1801. You would not disturb the machinery of the paddle itself?—We do not disturb the segments or the arms.

1802. You do not think it advisable to disturb them?—No; for we have so short a time between port, and port, there would not be time to ship them again.

1803. You do not think the skeleton-wheel would impede the vessel?—No, not more than an anchor-stock.

1804. Are you acquainted with any improvements which have been made of late in the steam machinery; do you know Hall's Condenser?—I am not particularly acquainted with them; it is under trial, and as far as I have seen of it, it looks well.

1805. Have you heard that those condensers have been adopted on board one of the new large vessels building for a voyage to America?—They are about to do it, but the vessel is not yet built.

1806. Have you any knowledge of the working of those condensers on board the Hercules, which plies between London and Cork?—Only by conversation and hearsay.

1807. Have you heard that they answer the purpose?—So far as I have understood, they do; they have given satisfaction.

1808. Do you know anything of the recent improvement in paddles?—Morgan's are certainly superior in point of power to anything we have ever yet had.

1809. Have you heard that those paddles are much more liable to wear and injury than the common ones?—They are certainly more liable to injury, but they wear equally; very much depends upon the care.

1810. Do you not think that the difficulty of replacing them would be an objection to their use in an Indian climate?—Certainly; the Medea, Captain Austin, by her own means, without any extraneous assistance, in 13 or 14 working days' removed the paddles and replaced them by others, and had them ready for work. I conceive great improvements may yet be made in paddles; there is an experiment now going on at Woolwich, Mr. Field's improvements; they have reduced the boards very materially, and find that the vessel goes faster, and the minimum is not yet come to: those large boards are by no means necessary at sea. I have tried, to a limited extent, the experiment myself, and was going on with it by a reduction of the board, and I found a great advantage in it.

1811. Do you mean by new and improved paddles?—With the common radiating paddles.

1812. Field's you have spoken of, are on a much simpler construction; much less liable to get out of order than Morgan's, are they not?—So many moving parts must be liable to wear and tear.

1813. What proportion ought to be the greatest width of the paddle, according to your opinion?—I cannot give a precise answer to that question; but I should say, generally, that all sea-going steam vessels are over-boarded.

1814. What immersion would you give the paddle-wheels of a vessel of the tonnage you have been describing?—One-sixth, I have understood to be the best mark.

1815. Do you suppose they should be deeper?—I would not immerse them more if I could avoid it, but they are unfortunately compelled to do so; by increasing the power, they get into the difficulty of immersing the boards, which is the reason in a great measure that light power acts better then heavy power; a ship may be over-powered.

1816. In the vessels which you commanded, what description of coal were you in the habit of using?—The Welsh, the Llanally or Llangennock, we found most economical.

1817. Why is there greater economy in that description of coal than in any other?—We find great economy over the Scotch; I have placed it at one-fourth; I find a fourth difference in the consumption of the Welsh and the Scotch coal.

1818. There is other coal to be had in the different English ports, which, though not the coal you speak of, is still applicable to the purpose connected with steam, is it not?—We find other coal affect the boilers; the better the coal the greater the advantage to the boiler in every respect, and the less the consumption, and the injurious effect upon the boiler is less.

1819. Is there not a great deal of waste in the Llangowish or the Llanally coal, arising from the quantity of dust or small coal mixed with it?—A great deal; but it should be supplied hand-picked.

1820. Have you tried any other coal besides that you have named?—The Scotch coal my attention has not been particularly directed to; we have been mostly in the habit of using the Welsh coal.

2821. You have never commanded any steam vessel which has taken a cargo?—No, only a ship of war.

Captain *George Barnes Brucks*, called in; and Examined.

1822. *Chairman.*] YOU belong to the Indian navy?—I do.

1823. How long have you belonged to it?—I have been 31 years in India; five of them in his Majesty's navy, and 26 in the Indian navy, out of which period I have been 27 years constantly at sea.

1824. Are you acquainted with the island of Socotra?—I have been at it, but of late, since it has been the subject of so much discussion, since the steam communication has been discussed, I have endeavoured to make myself acquainted with it by information also.

1825. Have you ever seen the survey of Messrs. Haines and Welstead?—Yes, I have.

1826. Having seen it, do you consider that that will make a very good depôt in both monsoons?—Yes, as far as anchorage goes.

1827. A doubt has been expressed as to the possibility of approaching it in the south-west monsoon; what is your opinion?—It is my opinion that if anchorage for a floating depôt (as the south-west monsoon would be the only period at which it was wanted) could be found under Cape Guardefui or Cape Felix, and I have reason to believe there is good anchorage under Cape Felix, coals in a floating depôt would much facilitate the vessels in the south-west monsoon, as in going up to Socotra at that season of the year they become exposed to the violence of the sea running out of the Gulf of Aden, which they would escape by keeping in with the African coast.

1828. You yourself have never been in either of those bays?—I have passed along the coast, but without anchoring. But there is one thing particular in this case necessary during the south-west monsoon, which I will state to the Committee: I have once beat up along that coast in a sailing ship, and as long as I could keep close to the shore, that is, within two, or three, or four miles, I found smooth water, and a breeze varying from two or three knots to five or six per hour, but as you increase the distance to four or five miles from the shore, you get into the force of the monsoon; the chances are, in a sailing vessel at night you lose what you have gained by a good look-out in the day; in a steamer, from being able to keep a direct course along the shore, you might always keep in the smooth water, and consequently there would be none of the violence of the wind and sea felt.

1829. Supposing that there is not a good place for a depôt in those two bays, there would be no impossibility of going to Socotra?—Certainly not.

1830. What is your opinion of the ability of the Atalanta or Berenice making a voyage from Bombay to Socotra during the south-west monsoon?—I think it is perfectly practicable to make a direct passage, but still not advisable.

1831. For what reason?—Although the vessels would go across, they would strain their engines; the vessels themselves would also become much strained; but by continuing down on the plan which is now given in, they would make the passage in an equally short period, with not more than two-thirds of the expense of fuel, at the same time at an immense saving of wear and tear.

1832. How near to the Line do you go?—Within two or three degrees, according to where I may find the light winds.

1833. What would be the distance from Bombay according to that course?—Two thousand three hundred and thirty-five nautical miles.

1834. It is only occasionally that the south-west monsoon blows with great fury?—In the south-west monsoon, at times there is a lull, indeed almost approaching to a calm; but that is never to be depended upon, for though you may have it so within a few miles of the coast, or have it so at a distance off the coast, will not find perhaps in any 150 miles during that line the same state of weather, neither can you depend upon the weather being the same for two days together.

1835. From what points does the wind blow in the south-west monsoon; the extreme points?—It may be taken at various periods of the monsoon, the early part of the monsoon, when it sets in on the western side of India, the wind blows in squalls from south-south-west round to about south-west-by-west. A month later, the squalls begin to get more westerly, till towards the month of August they very often blow as far round as west-by-north and west-north-west off shore; I have generally found the winds to hang with greater steadiness from west-south-west to south-west, and the squalls generally less violent.

1836. Have you been much in the Bay of Bengal?—I was cruising there during the years 1805, 1806, 1807, and 1808 and I was there employed on survey in 1814, 1815, and 1816, and I have made several passages round there since.

1837. What do you consider to be the practicability of making a voyage from Calcutta to Point de Galle to sail against the south-west monsoon?—I think it perfectly practicable.

1838. Is not the south-west monsoon as strong in the Bay of Bengal as it is between Socotra and Bombay?—At times I should say it was even more violent in the Bay of Bengal.

1839. Generally?—Generally; I should say it is more so on the western side of India, but they are much more liable to gales of wind on the bay than on the western side.

1840. Sir *John Hobhouse*.] But still there is nothing in the gales which you think a good steam-boat might not encounter?—As far as the gales go, I should think for the time they lasted that would generally put a stop to her progress; during the time the gales lasted in the bay she could not make way against them.

1841. You stated that those gales are more violent in the Bay of Bengal than in the Bombay seas?—I should certainly say so, but it is not to be supposed those are constant during the south-west monsoon; there may be two a year, or three, four, or five of them; and in some monsoons, none of them.

1842. *Chairman*.] How would you make the passage down the Bay of Bengal against these monsoons?—I have found, at that season of the year, keeping nearer to the coasts of Oressa and Coromandel is by far the better than getting into the centre of the bay or near the eastern coast.

1843. The south-west monsoon does not as it were come home on the coast?—No.

1844. You do not apprehend there would be any difficulty in going to Point Palmiras when the south-west wind blows with great power?—In the end of August and the early part of September 1814, we were sent down through a freak of the Marine Board in Calcutta to survey Point Palmas; we had the full benefit on our way down of one gale of wind, and another after our anchorage in False Bay; still, in a sailing-vessel we made way against it; in this part you have the benefit of tides.

1845. You are acquainted with the Port of Galle?—I am.

1846. Do you consider that a good harbour for steamers?—It is according as the question is to be considered; if it is to be a place which is to be a sort of head-quarters for steamers, where repairs and such things are to be done, if a large expense of outlay were incurred and a pier erected, and the means of heaving-down vessels, and other very large expenses, than Galle would be fully efficient; but if it is only as a port for the steamers or a mere starting point which they are not to look to for repairs of any consequence more than their own people could do on board, I should say Galle is a very good place.

1847. Sir *John Hobhouse*.] If it is to be made a place for repairing, or a depôt, or station, you think a considerable outlay would be necessary, in order to qualify it for such a purpose?—It would be impossible to do without it in that case.

1848. Are you acquainted with Trincomalee?—I have been in the harbour; even there, though there is great facility in Trincomalee, from there being, I believe, a wharf to heave down ships, as I understand, no King's ships have been hove down there; it might be done at less expense; but then there is a great disadvantage attending that in the south-west monsoon; you have the full fury of the monsoon to contend against between that and Dondrahead. If I am asked the comparative advantage of the two stations, putting the outlay out of the question to fit the places, I should say that Galle was superior in every point.

1849. Without reference to the outlay, supposing that there was no consideration of the money to be applied in fitting either Trincomalee or Galle, you would prefer Galle as a station?—Yes.

1850. Do you think there would be any difficulty in establishing regular steam navigation between Bombay, Galle, and Socotra?—I consider that there is no difficulty. In the first place, in accomplishing a passage direct, the steamer can do that; but still, from the circumstance of the fuel, or strain of machinery, she might possibly break down, and there would be a greater expense of fuel; if she had the passage direct across to overcome, I propose that the vessel shall go about 218 or 220 miles off shore, south-west by west, leaving Bombay, by which means, with the prevailing winds, she would make a course, according to what I have seen myself of the winds, about S. by W. ½ W. to SSW.; I have allowed five points; they say a steamer will make a course good at four till she came down to about two degrees and a half north of the Line; I would then, by going along 690 miles under steam, and, when practicable, sailing to the westward, which would be very near four degrees north; from that point they may put their fires out altogether, and get into the strength of the monsoon, and run up the course as per Diagram, till they make the land a little below Cape Guardefui, then round that under steam they may go along the African coast, where they will find smooth water near the shore; if it was necessary for them to go up to Socotra the wind would help them on, but they must of course get under steam again when they left the island for the coast, but it would be but a short distance. In regard to the passage from Galle to Socotra, I should steer out from Galle, going through one of the channels of the Maldives.

1851. You would not go to the south of the Maldives?—No, I should pass through with steam; I should then get the wind light, and have the full benefit of sailing, as before described in the Diagram.

1852. You think that, whether from Point de Galle to Socotra or from Bombay to Socotra, there are no difficulties even in the south-west monsoon, which would prevent the permanent establishment of steam navigation by either of those routes?—Certainly not. But I ought to mention, or it may be said I act inconsistently in India, as when I left India I was as great a bigot to the system laid down by Captain Wilson as any one knowing the seas could be, depending for information on Captain Wilson's report of the performances of the Hugh Lindsay; but since I came to England I have, under the sanction of the Court of Directors, made a point of going round in steam vessels to see what they would do, and I feel, from the experience I have gained, there is so little to prevent the constant communication being carried on, I should be quite ready to stake my professional reputation on the subject.

1853. *Chairman.*] Having, in India, entertained a different opinion?—Yes, having had no information but that derived from Captain Wilson's pamphlet, and no knowledge but of the Hugh Lindsay, a very inferior vessel to most here.

1854. Sir *John Hobhouse.*] What sort of vessel would you recommend for the navigation of the seas of which you are speaking?—I should say about 750 to 800 tons. In the south-west monsoon a large vessel becomes a matter of necessity. The vessel I should propose would not perhaps be quiet so large as I have mentioned. I should propose a vessel of the same length of deck as the Berenice, but with an increase of beam. The Berenice is about 29 feet between the paddle-boxes, I believe. The beam between the paddle-boxes I consider should be about one-fifth of the length of the deck, or about 34 feet 8 inches; that of course would increase the tonnage in giving the dimensions. I suppose the Berenice to be 750 tons, but find she is under 700.

1855. Have you made any calculation of the time necessary to go from Point de Galle to Socotra?—I could make the passage from Point de Galle to Socotra in the south-west monsoon in about 15 days and a half, allowing the average of six miles an hour; about the same as from Bombay.

1856. *Chairman.*] What is the distance?—The distance on the line I should say I should go over about 2,200 miles.

1857. Mr. *Mullins.*] At that rate it would be impossible for a vessel of the size of the Berenice to take coal sufficient to steam the whole way?—In the plan I suggest they do not steam all the way; they have the benefit of their sails for a run of at least 700 miles; on the plan I have given, I should think, in a south-west monsoon, they might always calculate on 60 days at the outside from Bombay to England, and 56 days probably; the minimum out at this season would be from 44 to 50 days, I think, as average.

1858. *Chairman.*] You have served a great deal in the Persian Gulf?—I have, and I have surveyed the whole of it.

1859. You have served against pirates, have you not?—Yes; in everything which has been done against them, with one exception, since 1805.

1860. What is the state of piracy in the Persian Gulf?—They are kept down by being constantly watched; the moment they know that there is not a watch over them, they begin to feel their way and commit petty acts of piracy; there was an instance of it in 1834, in consequence of a vessel being withdrawn to Socotra, which was usually employed in the protection of the trade of the Gulf, and others in the Red Sea, and there being only a limited number of vessels, one being employed in the Eastern Straits, the Gulf was left with only two vessels in it; the consequence was, the chief of Abothubby fitted out his vessels and put to sea, and before anything was known or anything could be done, property to the amount of about six or seven lacs of rupees was captured, and the people of course were many of them murdered.

1861. When did this occur?—The trial of the pirates took place in 1835; the Elphinstone fell in with them, re-captured several of the prizes, and got back a great deal; but the merchants suffered to the amount of a lac and a half at least.

1862. In what description of boats or vessels is this carried on?—There are three descriptions of Arab vessels; the buggalows, which vary from 40 up to 500 tons; and some being armed with a few matchlocks and swords; others carry two to 16 guns.

1863. How many men do they carry?—Sometimes, in large buggalows, when fitted for war, there are as many as 500 men. Then there is another class of vessels, called battills; they vary from about 20 to 150 tons; these vessels carry in the same manner from a few matchlocks and swords to about six guns; those are particularly speedy vessels in sailing.

1864. Sir *John Hobhouse.*] Do those pirates come down low to the southward, or confine themselves to the upper part of the Persian Gulf?—Of late years, since the expedition of 1819 and 1820, there have been only partial outbreaks; there never has been a general system of piracy since, for there has been a naval force to check them; but, previous to that, they have made captures as far south as Cochin on the Malabar coast.

1865. *Chairman.*] Might not steamers be advantageously substituted for sailing vessels in those seas?—I have already given in upon that subject to the Court of Directors a plan Mr. Loch gave me, the basis on which I was to go; and I clearly showed that with four steam vessels, two of the fist class and two of inferior class, with lighter guns, and two sailing vessels, the duties of the Red Sea and the Persian Gulf might be efficiently performed; in addition to which, I have shown the advantage to be derived from the employment of steamers; the instance I have given is, supposing some disturbance at Cutch or near the Indus, that it is necessary to send up during the north-east monsoon, the usual time for field operations, force to be collected from Poonah or Bombay, 4,000 or 5,000 men, one of the first class steam ships of war, which would not take above three or four or at most five days, to reach that port, embarking one regiment in marching order, and two native vessels carrying another regiment with tents and a portion of baggage; were those men sent by land, they would have a six weeks' march; were they sent in sailing vessels, they might get up there in 10 or 14 to 16 or 18 days; in steamers they might be landed in three or four days, and the vessels return and bring up another part of the force, and they would be landed quite fresh and ready for action, and within the distance of probably 60, 80, or 100 miles of the place where they would be called upon to act.

1866. You think, from your acquaintance with the peculiar circumstances of our Indian empire, the employment of steam vessels, not only for the purposes of communication, but of safety and protection and keeping that great empire together, would be peculiarly serviceable?—I have not the slightest doubt of it; at the same time, I consider it necessary to state that there are two points to which their duties will be directed, and in which their value ever will lie: the trade of the Persian Gulf and the Red Sea is immense; they take off large portions of produce of Bengal; a greater part of the surplus produce of Malabar and Canara; they take off an immense quantity of our imports from Bombay; and the quantity of our British manufactures they take off is very large; I think we cannot reckon far less than a million and a half for the import and export trade of the Gulf; the returns are mostly specie; and I suppose that of the Red Sea also to be to a large amount.

1867. In what way is your opinion borne out, of the superior advantages in the employment of steam vessels over sailing vessels?—In the first place, the steam vessels would always have such superiority over native vessels in which piracy is carried on; whenever they fell in with them, they would be able to cut them off before they reached their port; another thing is with respect to the armament of the steamer; there is not a port on the pirate coast in which the large guns they carry forward or aft would not destroy every vessel in the back water, which the sailing vessels, unless they are vessels of very large size, could not carry ordnance to do.

1868. You consider that the nature of India and the coast are peculiarly suitable to the employment of steam vessels, rather than sailing vessels?—I should say in regard to the employment of the vessels for the Indian navy, it would be most advantageous that they should be steam vessels; still a small number of sailing vessels is necessary.

1869. *Chairman.*] Will you state what number of steamers you consider necessary to protect the trade in the Persian Gulf and the Red Sea?—In the plan I have proposed for the Indian navy, in what I have given in to the Court of Directors, I have put two large and two small steamers; one of the present 18-gun sloops reduced to 14 gun, and one 10-guns brig, exclusive of the several vessels which perform a duty similar to the coast guard. In the Guzerat collectorate of customs there is always a great deal of small pilfering going on in Guzerat and Kuttywen; there are some small craft which perform these duties, but the expense of them is trivial; probably the whole expense does not amount to more than the expense of one of the higher class men-of-war.

1870. You propose to have two steamers of a large description, two of a smaller, and two sailing vessels?—Yes.

1871. How would you dispose of them?—In the first place, it is necessary that one vessel should be cruising in the upper part of the Gulf, in communication with Bushire, where the resident is stationed, that any information he may receive he should be immediately able to communicate with that vessel, to carry into effect any duty; she at the same time would protect the upper part of the Persian Gulf, in a line drawn from Cape Burdistan to Ellcatif. Another vessel is necessary to be cruising from Bahracin, taking in the whole line of the Arabian side of the Persian Gulf as far as the Bay of Cassamb. A third vessel, which is supposed to take the whole of the centre of the Gulf, a part of the Pearl Bank, and the whole line of the coast to Bassadore; at Bassadore, you can at all times and in all the prevailing winds, in a sailing vessel, reach any particular point on the pirate coast, and have communication from it: she should cruise off the island of Kishure, along the coast of Macoon as far as Guadell; she should also occasionally visit Muscatt, and run down the Batna coast: that employs four vessels; those are the Persian Gulf duties. There should be three steamers and one sailing vessel in the Red Sea; we must have one vessel to protect our trade there, for though there are not any pirates in the Red Sea, the unsettled state of government is such, if we have not a vessel in that sea the merchants are plundered and trade injured. In 1833, the whole of the Surat vessels were stopped at Mocha, and money was extorted from them, when the timely arrival of the Honourable Company's brig of war Nautilus, which had been despatched from Surat, prevented their being further plundered; but the season, in consequence of their detention, was passed in which they could trade, and they lost that year all their emoluments or profits from the trade of the place.

1872. With this monthly steam communication with the Red Sea, that vessel would become unnecessary, would it not?—I doubt that, speaking from the inconvenience felt by the surveying vessels; if you once attempt to interfere with the particular duties the steam packets are employed on, connected with that service, the regularity of the communication is broken, and great public inconvenience must result.

1873. Sir *John Hobhouse.*] You would not recommend the mixture of war duties with packet duties for the steam vessels ?—Certainly not, if there is not intended to be a breach in the regularity of the communication: suppose, at Mocha, a merchant vessel had arrived, and the government had seized upon it; the steam packet arrives, the commander cannot devote the time that may be necessary to afford that protection and to see those persons righted. But there would be this advantage to the packet navigation, by employing a steam vessel instead of a sailing vessel of war in the Red Sea, should the steamer break down, the war steamer may take her duties within the sea for a time; then a sixth vessel would be required for the purpose of reliefs to the Red Sea or the Persian Gulf; one vessel is as little as can be. I have been for 18 months without relief in consequence of the want of a vessel, and six months on a cruise at one time is as much as any vessel or crew ought to be called upon for in such a climate as the Persian Gulf or Red Sea.

1874. Mr. *Mullins.*] You are acquainted with the wear and tear of steam machinery in this climate: can you form any opinion as to whether there will be a greater degree of wear and tear in the Indian seas in consequence of the greater heat of the climate there than here ?—I should think not.

1875. Sir *John Hobhouse.*] Your general opinion is, that taking the line from the Red Sea to Bombay, or taking the line round by Galle to the eastern shore, that is to Madras and Calcutta, there is nothing in the present state of science to prevent a regular steam communication being kept up with the three presidencies ?—I have no hesitation in saying there is no difficulty whatever; and, as I have before said, I speak from long experience, having been 27 years employed in those seas; and there are, I believe, few people who can give a more competent opinion. When I left India, I should have said, there was a difficulty; but what I have seen since I came to England has convinced me that the communication may be kept up monthly.

1876. Whether to Bombay, or whether to the other two presidencies also, you think there is no difficulty which will prevent the keeping up a monthly communication between this country and those presidencies?—No: when the subject was broached to me at the India House, after I had been amongst the steamers, I at once stated that I was perfectly ready, on my return to India, to make the first start with a south-west monsoon, and to stake my reputation upon it.

1877. *Chairman.*] How many sailing vessels have you had occasion for in the Persian Gulf at the same time ?—Generally four.

1878. Mr. *Mullins.*] Do you think Camaran would be the best depot in the Red Sea ?—No; I will give a reason: there is a periodical wind, in which sailing vessels cannot get out for a certain number of months; it will not do to have a depôt, and to have a vessel detained there, and the expense of months' demurrage. Perim is a port of the Red Sea, which has every advantage of a harbour, and every thing necessary; the sailing vessels may go there, and deliver their coals, and the moment their coals are out they may start off. If they are in the Red Sea they are tied up for three months in the year, because the wind blows so furiously into the Red Sea, you cannot get out; the vessels of war may beat out, but they will have a great superiority over merchant vessels.

1879. Do you mean to say a steam vessel of sufficient power cannot beat out ?—I speak of sailing vessels carrying coals into the Red Sea; they would be detained, and an immense expense incurred; whereas, by the use of Perim, which is a port equi-distant, and has every facility, the vessels can land their coals, and get off.

1880. Are you not aware that Camaran is more equi-distant between Socotra and Suez than Perim; and do you not think that in consequence of that it would be better adapted for such a depôt than Perim ?—I am perfectly aware of that, so far; but I think, with proper steam vessels, except in the southwest monsoon, they will require no more than one depôt between Bombay and Suez.—

1881. Are you not aware that there is no water to be had at Perim ?—I am.

1882. Would not that be a great obstacle to the establishment there ?—No; for just opposite, at Cape Babelmandeb, water is plentiful, and might be brought over in any quantity.

1883. What is the distance across ?—About five miles; but I do not see any advantage in increasing the number of depôts.

1884. What is the amount to be allowed in annual charge upon the prime cost of a steam vessel, in the capital sunk, for interest, insurance, repairs, and renewals, at a rate calculated to create and perpetuate the property ?—I am not prepared to answer that question.

1885. Have you formed any estimate of the comparative expense of delivering fuel at different depôts, in the event of a regular communication being established with the three presidencies ?—I have taken what I should term the average expense of fuel, supposing it to be purchased at the various depôts. I have also formed an average estimate of what I consider the expense of the management of those depôts; one part of that is by means of a floating depôt; that is the best in the south-west monsoons; even if Socotra were used, it would be the best. The steamers may go alongside a floating depôt, and much time would be saved. I have framed an estimate of the expense of the depôts and the fuel. I will give it in.

[*The same was delivered in, and is as follows:*]

ESTIMATED EXPENSE of running three Steam Vessels as Packets between *Bombay* and *Suez*, each Vessel to be from 700 to 750 Tons.

I WILL begin with coal, and though I am aware it has been stated by most who have wrote on steam navigation in these parts, that when there is a demand for coals, ships going out will take them as ballast, and consequently they will become cheap, if reliance on such a source is had recourse to, the monthly communication will fail for want of supply, and also, the holders of coal knowing you must take them, will put their own prices upon them, which certainly will not be low; coals must therefore be sent from England direct to the depôts, and I think for Bombay and Red Sea together, 50*s.* per ton will be a fair average.

I consider the time of the voyage to Suez from Bombay, and Bombay to Suez, to take up, if all done under steam, 18 days, or 36 days' steaming per month for two vessels, and at 18 tons per diem consumption, will be 7,776 tons per annum, add 100 tons for wastage, dust, &c., give 7,876 tons; allowing 50 *s*. per ton, this will cost per annum	**£. 19,680**
Stores per annum for three vessels	**3,500**
Pay and provisions for captains, officers, and crews of three vessels	**12,084**
*** Expense of two floating and one shore depôt, in and near the Red Sea**	**3,500**
*** Depôt at Bombay**	**1,000**
Supposed outlay on three steam vessels to be 120,000*l*., as the Company do not insure, allow on this seven per cent	**8,400**
*** Coal hulks, say 20,000*l*., seven per cent., is**	**1,400**
*** For a foundry to make repairs, materials, &c., at 20,000*l*.**	**1,400**
*** Establishment and expenses for working the above, including engineers, boiler-maker, and all other workmen, per annum, about**	**3,400**
Spare parts of engines say to the value of 20,000*l*., at seven per cent	**1,400**
Contingencies, at 12 per cent	**5,372**
	£. 50,136

In this estimate I have, I believe, included every possible expense; many will be reduced when we are able to get natives instructed as working engineers, though it will be long before a chief engineer from Europe to each vessel can be dispensed with.

As sail may be much used, a saving, with care, of perhaps one-third of the estimated expense of fuel may be made.

Those items with * prefixed, will not be increased by any number of steam vessels being employed, they being equally necessary for one as for ten.

There may be some omissions in these calculations; still I do not think there can be any of the least consequence to the whole.

Geo. Barnes Brucks,
Captain, Indian Navy.

The Right Hon. *Sir Alexander Johnston*, called in; and Examined.

1886. (*Chairman*.) HOW long were you in His Majesty's service in Ceylon?—Sixteen years. During that period I filled successively the offices of advocate-general, judge, chief justice of the Supreme Court, and president of His Majesty's council.

1887. Were you in 1809, when a member of His Majesty's council on that island, sent officially to England by the government of the island, for the purpose of urging the adoption by His Majesty Ministers of certain public measures which you conceived to be of advantage to the island?—I was sent officially to England by the government of Ceylon in that year, for the purpose of proposing to His Majesty's Ministers various measures which I thought necessary to restore the ancient trade of the island, and to improve the condition of the natives. Amongst many others, I proposed three measures, which were more immediately connected with the improvement of the trade of the island. The first was, to make Point de Galle, by declaring it a free port, and by holding out many advantages to vessels of all nations who might stop there, an *entrepôt* of the trade which is carried on between Europe, Africa, and America, on the one side, and the coasts of Coromandel, Bengal, Sumatra, Java, Malacca, Siam, Cochin China, China, and all the eastern islands on the other. The second was, to deepen the narrow channel in the Gulf of Menar, called the Ponikeem Passage, so as to enable vessels drawing from 10 to 12 feet water to pass through it. The third was to deepen the entrance into the harbour of Cocheen, on the Malabar coast, and to open a communication by water from that coast to the coast of Coromandel, through the break in the Ghauts, called the Paulcaud Cherry Pass, by uniting the waters of the river Paniyani which fall into the sea on the former coast, to those of the river Caveri, which fall into the sea on the latter coast.

1888. Do you think that making Point de Galle one of the stations for the steam-boats employed in the steam communication between Egypt and British India will forward the objects which you had in view, by the measures to which you have alluded, and be of great use to the island?—I conceive that it will be of the greatest use to Ceylon, by introducing capital through that port into the southern part of the island, and by bringing capitalists to it who can purchase the many valuable articles of trade which are produced in that part of the island.

1889. Do you think, from what you have seen and heard of the place, that Point de Galle will be a good and safe harbour for the steam vessels?—I think so from an inspection of this chart, and from what I have heard from persons competent to give an opinion upon the subject. Mr. Gibson, a very old and intelligent seaman, who was master attendant at Point de Galle in 1808, when I was preparing to come to England for the purposes I have mentioned, gave me this chart of the port, which he had himself made from his own personal observations, and also a very detailed memoir, written by himself, of every circumstance which may be necessary to enable seamen and merchants to form an opinion upon the nature of the port. Point de Galle, from my own personal observation, seemed to me to be a very convenient port for merchant vessels to stop at, because a great quantity of cocoa-nut oil, arrack, coir, coffee, cinnamon, and other articles of trade can be conveyed to it without difficulty from different parts of the country, because there were warehouses there in which the merchants could deposit their goods, and because there was a plentiful supply of fresh provisions, vegetables, fruit, and good water, and a fort to protect the shipping in the harbour.

1890. Do you think that it would be a convenient place to come to for passengers, as well those who are going from England to India as those who were coming from India to England?—I think it will, because passengers may go from thence to all parts of India either by embarking in a vessel at that port or by going overland to Colombo or Menar, and crossing over the sea from either of those ports to the peninsula of India, because the place is extremely healthy, is situated in a very pretty country, and affords great facilities for visiting the finest and most interesting parts of the island; has a daily post, by which one can communicate with every part of India, and because there is a very fine road, along which you may drive a carriage and horses all the way from it to Colombo.

1891. Do you think that the establishment of a steam communication between England and British India through Egypt will be of use to the northern part of the island of Ceylon?—I think it will, because I think it will ultimately lead to the deepening the Pombaum channel to which I have alluded, and to the carrying on again through that passage, in the same manner as it used to be carried on till the middle of the 14th century, a considerable portion of the trade which is carried on between the eastern and western sides of the peninsula of India. The trade between Egypt on the one side, and China and the Eastern Islands on the other, was, in ancient times, carried on, I think, from the port of Adulis, on the western side of the Arabian Gulf, either by sea, through the Pombaum Channel, or by land, through the northern part of Ceylon, with Trincomalee, and from thence with China and the Eastern Islands.

1892. Why do you particularly refer to the 14th century?—I do so because from the inquiries which I made many years ago, along with the late Colonel Colin Mackenzie, into the ancient history of the peninsula of India, I found that vessels of very considerable burthen used to pass through that channel until about the middle of the 14th century; that about that period one of the chiefs of the Marawar country, which is situated along the south-east coast of the southern peninsula of India, for the purpose of protecting his coasts from the attacks of the large Arab vessels which used to come from the Malabar coast, through the Pombaum channel, and plunder the towns he had upon the sea-shore, sunk a great many boats full of large stones and pieces of rock in that channel, and rendered it impossible afterwards for any large vessels to pass through it. On referring, in the year 1806, to some papers of my father-in-law, the late Lord William Campbell, who at the time he wrote them was serving as a lieutenant in the Indian squadron, I discovered that he had, about 30 years before that period, examined the Pombaum channel, and made several very curious observations upon it, and had come to the conclusion that in former days it must have been much deeper than it was then, and that it was practicable to deepen it again, so as to admit of vessels drawing from 10 to 12 feet water passing through it, as he states in a letter to his brother, the late Duke of Argyll, and Marshal Conway, who was at that time a member of the then administration. In 1807 I went all along the passage in a boat myself, for the purpose of examining it; and though I had no scientific man with me, I was led to the same conclusion as Lord William Campbell had been, from the observations which I myself made upon the spot, and from the information which I received from the Brahmins of Ramisseram, an island near Pombaum passage.

1893. Do you think, from the information which you have collected upon the subject, that it would be practicable to render Cocheen, if the steam communication is once established between Great Britain and India, a useful port of trade; and that it will be of advantage to the southern part of the peninsula of India to make a water communication from the Malabar coast to the Coromadel coast?—From some papers upon the subject, which I procured from the Dutch archives of Cocheen, I think that Cocheen may become, if the steam communication between Egypt and India be permanently adopted, a port of considerable commercial importance to the trade of the southern peninsula of India, particularly if it should be found, upon further examination, to be practicable to make a water communication between the coast of Malabar and the coast of Coromandel, through the Pollichandcherry Pass. The trade between Egypt and the southern part of the peninsula of India was in ancient times carried on, I think, from the port of Adulis, with Cochin, and from thence by land through the Pollichandcherry Pass, with the ancient kingdom of Pandy, and all the other countries in the southern part of the peninsula of India.

1894. Do you recollect any estimate being made at the time for deepening the Pombaum Pass?—A rough estimate was made at the time for me. It appeared that the expense of deepening the Pombaum channel, in the manner I have described, would amount to about 20,000*l.*; and that, by levying a small duty upon the vessels which were likely to pass through it, that sum might be repaid to Government in a few years.

1895. Do you conceive that great and advantageous moral and political changes will be produced in the condition of the natives of India by the establishment of a regular and frequent steam communication between England and every part of British India, through Egypt?—I conceive it to be the most efficient measure which can be adopted for raising the moral and political character of the natives of British India, and for affording them those moral and political advantages which they have a right to expect to derive from their present connexion with Great Britain. It will, from the shortness of the passage, and from the interest which is attached by all persons to the countries through which the travellers must pass, induce many persons, as well Englishmen as foreigners, who otherwise never would have thought of doing so, to proceed to India, and make themselves acquainted with the history and people of that portion of Asia; and thereby call the attention of Europe in general, and of the British public in particular, to every circumstance of importance which is connected with the subject. It must ultimately improve the nature of the British government of India, by enabling the natives of the country, without doing an injury to their religious habits and feelings, to come to England, and submit their opinions upon all public questions involving their public and private interests, directly to both Houses of Parliament; and thereby render it necessary for the local governments of India to consult the natives of the country on all questions in which their interests are concerned. It will secure for the natives an efficient system for the administration of justice throughout their country, by affording them, in case they think themselves aggrieved by any decision which has been given by any British court established in India, an easy way of getting their appeals to England with less delay and less expense than is the case at present. It will be the means of improving the minds and raising the character of the natives, by enabling them to observe upon the spot the practical effect of our religious, moral, and political institutions, of our constitution, of the influence of the press, and of public opinion upon the government, and of the share which each Englishman has, either directly or indirectly, in that government. It will make them acquainted with the application of machinery and chemistry to agriculture and manufactures: it will give them a taste for the arts, science, and literature of England, and a desire to introduce them amongst their countrymen. The effect which is likely to be produced upon the minds of those natives of India who may hereafter be induced to come to England may be fairly estimated from the effect which a residence in England has had upon the mind of Prince Jamh-ud-Dih, a Mahometan, and a grandson of Hyder Ali, and upon that of the late Rammohun Roy, a Hindoo, and a Brahmin of high caste; the former having travelled through England, Scotland, and Ireland, and having acquired a general knowledge of the country and its institutions, has, I understand, become a proprietor of India stock, and thereby qualified himself to take an active part in the British government of India. The latter, after having studied for some time with great attention the nature of our laws and institutions, gave some very important evidence relative to British India and his countrymen before a Committee of the House of Commons, and wrote an able pamphlet in favour of the regulation abolishing suttees at the time that regulation was discussed on an appeal against it before the King in Council. He told me that 18 Brahmins and four Rajpoots of his acquaintance, in different parts of India, had in consequence of his having written to them an account since he had been in the country, authorized him, in the event of a steam communication being established between England and British India through Egypt, to purchase land for them in England, intimating to him their intention of coming and residing for some years in the neighbourhood of London, and making themselves acquainted, for the benefit of themselves and their countrymen, with our laws, science, and institutions; and not long before his death, he one day when he was with me drew up in my presence the sketch of a work which he intended to write in imitation of Cicero's Tusculan Questions, and to circulate it throughout every part of India purporting to be a Dialogue between a Brahmin from the Thames and a Brahmin from the Ganges, in which, after discussing our moral and political institutions, both Brahmins agree to recommend such of their countrymen as can afford it to come to England and acquire that degree of knowledge which is necessary to raise them to that moral and intellectual superiority which the Supreme Being has qualified them to enjoy in this world. He was very unwell at the time, and requested me in case of his death before he could complete the work, to destroy the sketch, which I have done.

1896. Do you anticipate any danger to the British dominion from such improved knowledge?—I do not; I conceive that you cannot prevent the diffusion of knowledge throughout India, and that the surest way of retaining the dominion of the British government over India is to establish a good system of education amongst the natives, and to give them such a share in the government of their country as may make them feel that they have a deep interest in the duration and security of that government.

1897. Mr. *Mullins.*] In the event of communication with India being limited, according to the plan at present determined on between the Government and the East India Company, do you suppose that the expenses that would be created by that limited intercourse would be much greater in proportion than if the intercourse was to be established upon a general and comprehensive plan?—Not having directed my attention to the subject, I do not feel myself competent to give an opinion upon it.

1898. Would the other presidencies have, in your opinion, just cause of complaint, and would they not feel very much annoyed if the communication was to be restricted to Bombay, and advantages thereby given to that presidency which other presidencies would not have it in their power to enjoy? —I certainly think they would have a most just cause of complaint.

1899. Do you not consider it a matter of much more importance that a direct communication should be established with Calcutta, being the chief of the presidencies, than with Bombay?—I myself think that a direct communication ought to be established with all the presidencies.

1900. If there was to be only one communication, is it not your opinion that the one with Calcutta would be far preferable to the one with Bombay, and that Calcutta would have greater claims?—If there was to be a direct communication with only one of the presidencies, I think it ought to be with that one which is of the greatest commercial and political importance.

1901. Do you suppose that, in the event of there being a limited communication to Bombay only, passengers would be likely to avail themselves of that mode of communication to pass to Madras or Calcutta by land, in place of going by sea by the Cape of Good Hope?—I should think that single men would always prefer going to Bombay by the steam communication, and from thence by land to Madras and Calcutta; but that married men, with families, at least for the present, while the steam communication is in its commencement, would prefer going round the Cape of Good Hope by sea.

1902. You do not think it would be convenient for women or children?—I should think, from what I hear, that it is not at present convenient for women and for children.

1903. Is it your opinion that a greater number of passengers than at present go by the Cape of Hope would be likely to avail themselves of the quicker mode of communication with India now proposed?—I think a great number of travellers from England and from Europe are very likely to go to India now that a steam communication is established who would not have thought of going if they had been obliged to go to it by sea round the Cape of Good Hope.

1904. Do you suppose it likely that literary works would be despatched from this country in a much larger proportion than they are at present, in consequence of the greater facility of intercourse?—I think that a greater number of periodicals and literary works of that description are likely to be sent to India now that the passage is so short than there were when the only conveyance for them was round the Cape of Good Hope.

1905. Do not you think that, in relation to periodicals and that species of literary works, the speedy transmission of them would increase the sale?—I have no doubt it will.

1906. According to your consideration of the various advantanges, commercial and other, likely to arise from a more speedy communication with India, is it your opinion that there ought to be a communication immediately established with the different presidencies, and not limited, as at present proposed, to one?—I am decidedly of that opinion.

1907. Can you form any idea of the superiority of the advantages, in point of return, that would be derived to India from a more general communication?—I have not directed my attention to the subject, and cannot venture to give an opinion upon it.

[Adjourned to Thursday next, at Twelve o'clock.

Jovis, 13th die Julii, 1837.

MEMBERS PRESENT.

Lord William Bentinck.
Mr. Gordon.
Sir John Hobhouse.
Mr. Mullins.
Lord Sandon.

LORD WILLIAM BENTINCK, in the Chair.

Captain *Melville Grindlay*, called in; and Examined.

1908. *Chairman.* YOU were in the Company's military service?—I was.

1909. How long were you on the Bombay establishment?—Fourteen years; I have been returned 20 years and more.

1910. Have you kept up any connexion with the officers of the civil and military Company's establishment in India since you returned?—A most extensive one. I have maintained correspondence with every part of British India, and I have constantly been associated in this country, both in matters of business and in social intercourse, with a wide circle of persons connected in almost every possible way with India; with some who have passed long periods there, and have finally quitted it; with others, whose absence is only temporary, and who propose to return; with others again, who are about to proceed thither for the first time, and with many who, though never resident in India, and never intending to reside there, are in various ways connected with it, and are intimately acquainted with the wants, wishes, and feelings of the inhabitants both British and native. I may mention also that the circle to which I have alluded comprehends persons in different professional walks; members of the civil service, of the military service, and of the commercial community. I may, I believe, without incurring the imputation of undue assumption, say that my acquaintance with those interested in India and its people is little short of universal.

1911. Will you state what the feeling of those individuals generally is with respect to steam communication in India?—I know the feeling in favour of a regular system of steam communication to prevail almost without an exception, and that it is expressed with a degree of intensity very rarely excited by any public question in a country so little favourable to the development of moral or physical energy. The extension of this feeling has for some years past been progressive, as is well known to the Noble Chairman of this Committee, and the greatest disappointment would be felt if the desired boon were refused, or even unnecessarily delayed, or limited to Bombay only.

1912. How far would the Indian officers, civil and military, in your opinion, be disposed to avail themselves of the route by the Red Sea?—I have no reason to doubt that, in the first instance, perhaps the first year or two, there would be about one-fourth of the whole number of passages, which would gradually increase, as the accommodation became more constant, defined, and certain, to four-fifths of the whole number, that is, provided only that it be extended beyond Bombay, to Madras and Calcutta.

1913. Do you give that opinion founded on any specific data or circumstances?—The circumstances on which I have founded that opinion are the frequent conversations I have had with gentlemen connected with India, contemplating their return, and the many applications I have had from them for information connected with it, and for the purpose of making arrangements to enable them to avail themselves of it, when it should become fixed and certain.

1914. What is your opinion of the relative expense between the passage round the Cape of Good Hope and the passage by the Red Sea?—I should think that it would be about equal; probably the expense overland may be hereafter diminished, but that will very much depend upon the arrangements which are made, of which I can have no knowledge at present; I cannot entertain any doubt of it; they would gain much in point of time, and they would gain much in point of certainty; and in place of the unpleasantness and danger attending a passage by the Cape, they would enjoy a trip of pleasure on the Mediterranean. I say nothing of the opportunity of visiting places rendered interesting by historical recollections, although this would also operate with many, if not with the majority; but looking only to the superiority in point of speed, certainty, and comfort, it appears to me incredible that such advantages should be rejected, if placed within reach.

1915. Would there be any difference with respect to the outfit?—In the equipment of officers in returning, I conceive there would be; because an officer returning, by the Mediterranean and the Red Sea would require a much smaller sea stock, and that is a considerable portion of the expense of an equipment; he would probably send round to the presidency by sea the bulk of this baggage, and would require a very small portion with him; I think he would save by it. Steam navigation is undoubtedly more expensive than the ordinary mode, but then the time consumed in it is much less, and consequently the requisite outlay for the subsistance of the passengers will be much diminished. This applies especially to the class of passengers who usually pass between England and India. Where passengers are of a very humble class, and require only ordinary accommodation, the difference between keeping them one month or two, would not be great; but where they expect a high degree of comfort, and even some degree of luxury, the saving effected by the abridgment of time will be considerable. The comparative certainty of the passage also will enable a commander to proportion his supply of stores to the demand more accurately than when he has no means of judging, with any fair degree of probability, how long his voyage may last, and this will be another source of saving. With all these advantages, the passage by steam must still be expected at first to be somewhat higher than the present amount of charge; but wherever time is an object, and wherever comfort is an object, it will be cheerfully paid.

1916. Mr. *Mullins*.] Have you considered the comparative expence to the Company and the Government of a general communication with the different presidencies, and the particular communication as at present arranged to Bombay?—I am not prepared to speak with any degree of useful certainty on that part of the question; it does not lie within the reach of my ordinary routine of business; I can therefore only give an opinion formed on documents which have been before the Committee.

1917. Are you aware that, in a communication with Bombay alone, there must be a certain number of depôts and establishments for coals; for instance, hulks; and that, in the case of a general communication, there would be no necessity for any extra establishments to a certain extent?—I am aware of that; and it has appeared to me in reading the documents and the evidence given, a very strong argument in favour of a comprehensive plan, that a very small proportional difference of expenditure will accomplish a much more advantageous result: I consider it worth any partial increase of expenditure. If the communication be confined to Bombay, its advantages will be in a great degree confined to Bombay also. The rest of India will gain something in the transmission of letters, but that will be all.

1918. And the increased expenditure, you think, would be met by a countervailing return?—I have no doubt of it. By confining the communication to Bombay, those who undertake it will loose nearly all the profit to be derived from the conveyance of passengers; and further they will lose, even in a greater proportion, the profit, probably much larger, to be derived from the conveyance of goods of small bulk. Nothing but letters will be forwarded overland from Bombay, where a sea conveyance of any kind can be had. Now, in a vessel of a proper description, there will be a considerable tonnage, (considerable, I mean, in relation to the object,) applicable to the stowage of goods of small bulk. This advantage must in some degree be lost during a part of the year on the Bombay line, from the necessity of carrying an extra quantity of coals while the monsoon is at its height; but to and from Calcutta it is always available, and would be at once a source of great accommodation to the public and of profit to the government. This advantage, as well as many others, will be lost, unless the more comprehensive plan be adopted.

1919. In India, you believe the feeling in favour of the comprehensive plan, to be very strong?—It is as strong as any feeling of the kind can be, and is entertained almost universally. No other plan will afford either adequate accommodation or any general degree of satisfaction.

1920. *Chairman*.] Do you know that it is in contemplation at any of the presidencies in India to establish a steamer on private account?—I am led to conclude there is some intention of the kind, as a Bombay presidency gentleman, who arrived within the last two months, who came by the last overland route, applied to me for information regarding the purchase of steamers ready built, or the construction of them after a certain plan and dimensions, and he stated that it was contemplated by the commercial gentlemen of Bombay to run a steamer from it to Ceylon, touching at various ports on the Malabar coast; he has since informed me that nothing specific has been determined on.

1921. Have you heard that a steamer called the North Star is about to be sent out to Calcutta on private account?—I have heard of that.

1922. Do you anything of the establishment of a steamer at the Mauritius?—I do not.

1923. Or in Australia?—I have heard that there are some running backwards and forwards, and that they are considered of great value to the community.

1924. In your communication with officers belonging to the China trade, do you believe that the correspondents and passengers would take that line from Galle to Canton?—I have not had many opportunities of conversing with persons connected with China: but, from the general observations I have made, I am inclined to think passengers for all parts of the East would most gladly avail themselves of this route, if made comprehensive.

1925. Mr. *Mullins*.] Have you formed an opinion as to the size and power of the vessels it would be best to put on such stations?—I could not give an opinion that would be useful, not being sufficiently informed upon the subject.

1926. *Chairman*.] With regard to passengers, how far would those proceeding to and from Madras and Calcutta be benefited by a steam communication confined to Bombay?—Scarcely at all; speaking generally, none would submit to the fatigue and inconvenience of the land journey between either Madras and Bombay, or Calcutta and Bombay, if it could be avoided. Of those proceeding to India, the greater portion are not inured to the climate, nor accustomed to the modes of travelling. It is true that they must in many cases be compelled to undertake a land journey in order to arrive at their respective stations; but the necessity of making one disagreeable and dangerous journey can afford no reason for adding to it another, that may be avoided; on the contrary, as far as it affects the question at all, it operates the other way; it is an additional reason for avoiding land travelling, where it may be avoided. With regard to those quitting India, the case is still stronger; it is not too much to say that the majority of those returning from India is composed of females, children, and persons in ill health, who require all the ease and comfort that is attainable; to them a tidious and convenient land journey, and more especially if it is to follow one of a similar character, is out of the question; and the consequence will be, that those who stand most in need of the advantages of a steam passage, and who on the ground of humanity have the greatest claim to accommodation, will under two of the presidencies, be deprived of that which is so desirable for them; they must submit to all the delay and inconvenience of a voyage by the Cape; and whatever their state of health, or the urgent necessarity of their early arrival in England, they must pass four or five months on a passage which might be accomplished in less than two.

Major *C. F. Head*, called in; and further Examined.

1927. *Chairman*.] CAN you give any information respecting the Maldive Islands?—I hold in my hand a report, which was sent from Calcutta, of a survey made by Captain Moresby, of the Indian navy, in which it is shown that Heawandee Island, the head of the Maldives, is a place capable of receiving a steamer at all times of the year, and of affording safe anchorage; that it may be available at any time, and that it divides the distance between Socotra and Point de Galle, so that the long stage would be only 1,173 miles, which is the distance from Zamareed to Heawandee Island; and this distance from

Heawandee Island to Point de Galle is 426 miles; so that there is no stage between England and Calcutta having a distance of more than 1,200 miles. There is also a list, in the survey of the population, and the number of boats in those islands, which shows that every facility can be afforded for steam vessels.

The Witness delivered in a description of Heawandee Pholo. the northern Atoll of the Maldive Islands, with a map.—Vide Appendix.]

The Honourable *Mountstuart Elphinstone*, called in; and Examined.

1928. *Chairman.*] WHAT is your opinion of the probable effects, political and moral, of a communication with India by steam?—I think the effect would be highly advantageous, both in a political and a moral view.

1929. Have the goodness to state the political advantages you would expect from it?—The most obvious is that of a ready transmission of intelligence and instructions during war, especially with an European power; but many inconveniences would also be removed by more speedy commucation in matters relating to the internal government. Much time is lost in waiting for replies to references on ordinary subjects; and as there are various inportant points in which the government is restrained from acting without authority from the Court of Directors, opportunities must often be lost, and evils left uncorrected, during the time occupied in obtaining the requisite sanction. I am aware that a great part of this delay is occasioned by other causes than the slowness of the communication; but I think that if a speedy and certain channel were established, here would be greater dispatch in inquiry and decision than are likely to be while it is doubtful whether such exertions will be of any avail. Some bad consequences may follow an accelerated intercourse between the government here and in India, but none which may not be avoided by care on the part of that in England. The authorities at home would probably forbear from availing themselves of the greater means of interfering with affairs, during their progress, which in almost all cases are better left to those on the spot. They might also be as much depended on as ever for taking time to consider of all proposals for great change, and for avoiding all such proceedings as were likely to diminish the importance and responsibility of the local governments.

1930. What do you conceive will be the effect of increased facility of communication on the members of the Company's service?—It may perhaps lead to inconvenience, by promoting appeals and the employment of private interest against the decisions of the local governments; but that will be be more than compensated by the more frequent visits of the Company's servents to England, and the greater infusion of European ideas, which cannot fail to extend their views and increase their efficiency. It will also tend much to strengthen their connexion with their native country; the possible diminution of which has on former occasions given rise to serious apprehensions.

1931. What would be the effect of a ready intercourse on the other classes?—I do not think that the other classes would be so much effected by the improvement of the steam communication as the Company's servents. It would not increase the number of settlers; for when a man has made up his mind to a permanent residence in India, a month or two more or less in the length of the voyage would make little difference to him. The same applies to missionaries, editors of newspapers, and othes who are likely to give too great an impulse to discussion in India. It would probably increase the number of travellers, who will have the attractions of Egypt and Arabia, instead of the discouragement of a monotonous sea voyage. This will be useful, from its effects, in India, and still more so from the attention it will draw to that country, and the interest it will excite about it at home.

1932. What do you think will be the effect of a more easy communication with England on the natives?—I think it will have the best effects, though they may not be felt to their full extent at first. The real obstacles will not be much diminished; for after the effort necessary for a native to form the intention of visiting a country so remote and so unlike his own, the addition of a short time to his passage would not be likely to deter him; but there is a great deal in getting rid of the vague dread of a sea voyage; and although the overland journey, as it is called, would prove to be almost entirely made by sea, yet, when once a native has been tempted to inquire into particulars, he would find the actual difficulties to be very small. The novelty of a steam convenience will excite attention. Two or three successful visits will lead to more attempts; and it is to be hoped than that the fashion will spread among the rich and educated classes. The advantage of the visits of such persons would be incalculable. More would be learned by an intelligent native during a year's residence here, than by many year's study in India; and each individual, on his return, might open more ideas to his countrymen than the ablest European could ever hope to do.

1933. Do you apprehend any ill consequence from the influx of natives into England?—No. There may be an increase of petitioners at the India House, which is troublesome, without being of much use, for their affairs are seldom such as the Court Directors could interfere in; but if it is not required for redress of grievances, it is useful as a vent for discontent; and no man will undertake such journey, with the knowledge that a year's residence will also, in all probability, be necessary in this country, unless he is actuated by strong feelings of the importance of his case. A greater evil would be, its teaching native princes and rich individuals to look to England, and to hope to effect, by intrigue and by private influence here, what they have failed to accomplish in India; but there is more to be feared from Europeans than from natives in such intrigues, and there is less chance of their being resorted to now than there was when this country was less known in India. It is also sometimes said, that a familiarity with the institutions of Great Britain would indispose the natives to obedience to the government in India; but I do not see that danger. If they only get a taste for popular government, or a disposition to legal assertion of their rights. it would be an improvement in their character; and with respect to factious feelings against the local government, I think they are more likely to acquire them in Calcutta than here, where they are less liable to be dazzled with the novelty of liberal opinions and where they may observe that it is not so simple a matter to carry those opinions to their full extent as it seems at a distance. Besides, I do not think that there is any fear of disturbances in India from democratic principles. The real sources of danger there, are national prejudices and religious enthusiasm, both of which would be weakened by visits to England.

1934. What other effects do you think steam navigation would have in India?—I think the free communication, as far as it went would be useful in many ways; merchants would have more facility in ascertaining the state of the markets, and manufacturers in suiting their productions to the native taste. The greater quickness with which books and instruments might be ordered, the greater ease in printing both native and European books, and, above all the increased attention which we might hope the two countries would pay to each other's proceedings, would be the means of procuring important benefits to India. The effect of the more direct influence of the English press might have been questionable while that of India was restrained; but I think there is no doubt that it would be useful now. If the acts of the Indian government attracted notice in this country, the discussion of them by the newspapers attached to different parties would secure a more impartial examination of them than they might meet with in India; and if in the progress of colonization there should come to be any opposition of interest or feeling between the Europeans and natives, I think the natives would have a better chance of being treated with fairness in the English newspaper than in an Indian one.

The Right Honourable Lord *William Bentinck*, Chairman of the committee, Examined.

1935. Sir *John Hobhouse*.] HAVE you prepared any statement with reference to an extended plan of steam navigation with India?—I have.

1936. Will your Lordship have the kindness to produce it?—I will state my opinion on that subject. The total distance from Calcutta to Suez is 4,810 miles: supposing one voyage from Calcutta to Suez and back to be made monthly, the total distance is 115,440 miles; the distance from Bombay to Socotra is 1,210 miles; which for 24 voyages gives 29,040 miles. The whole distance will be 144,480 miles to be made by steamers.

1937. Do you mean that that is the direct distance, or the distance it would be necessary for a steam-boat to take in order to make the voyage?—It is the direct distance. According to the calculation of Mr. Peacock, one steamer can perform only 16,000 miles per annum; but according to a calculation of the Peninsular Steam Navigation Company, one steamer can perform 24,000 miles. I have taken a variety of numbers of miles, between 16,000 and 24,000, as showing the number of steamers that would be necessary. Supposing a steamer to go 16,000 miles, there would be required nine steamers for the whole communication; supposing 18,000, eight; 20,000 seven; 24,000, six. I will assume ten steamers as a proper establishment for the comprehensive plan.

1938. When you say ten steamers do you mean ten in employment, without any laid up to be occasionally employed?—I mean for the whole. The expense of two steamers, taken from the cost of the Hugh Lindsay, is estimated by Mr. Peacock at 22,000*l.* per annum; an estimate has been put in by Captain Brucks, a very old officer of the Bombay marine, with very minute calculations, giving the expense of each steamer under 17,000 *l.* per annum. I know that the expenses of the Hugh Lindsay were very extravagant, as to the table, coals, and generally as to repairs and outfit; I will therefore take the estimate at 20,000 *l.* per annum, which is 2,000 *l.* less than Mr. Peacock, and 3,000 *l.* more than Captain Brucks': the expense of ten steamers, at 20,000 *l.* a year each, makes 200,000 *l.* Then the profits I have estimated as follows: I conceive that the passengers in the first year would be 800; the second year, 1,200; and the third year, 4,600; giving an average of 1,200 per annum. The whole number that go round the Cape of Good Hope, I think, are about 32,000 per annum. The passage-money I calculate as follows: Calcutta to Suez. 70 *l*; Madras, 65. *l*; Bombay, 60 *l*; giving a profit of 50 *l.* on each passenger: 1,200 passengers, at 50 *l.*, giving 60,000 *l.*; 200,000 letters, at 1 *s.*, between Suez and Calcutta, 10,000 *l.*; freight, 50 tons, at 5 *l.* (each vessel being calculated to give 100 tons), 6,000 *l.*; parcels and periodicals, 100 *l.*, for 24 voyages 2,400 *l.*; despatches, 500 *l.* for each voyage, 12,000.; giving a total of 90,400 *l.* The total charge, then, is 200,000*l.*; the profits, 90,000.; leaving a deficit of 110,000 *l.* I stated at the commencement of this inquiry that I thought no part of the expense for the communication between Suez and India should fall upon Great Britain. It was and is still my opinion, that with the aid of the naval establishment actually entertained in India, the whole charge of the comprehensive scheme, if managed only with common prudence, would be defrayed by the returns. I shall now explain this opinion. In Bengal, the Indian government as was stated by Mr. Peacock, maintain three steamers: of these, however, I know that two, having been built as war-steamers during the Burmese war, and being heavy vessels and slow, are not fit for the packet service, I would require to be replaced. I would propose to allot two of these to the packet establishment, the third being kept for the government service in the Bay of Bengal. This would create a deduction of 40 000 *l.* In the same way, I would apply the Indian navy, the expense of which in 1833 was estimated at 180,000 *l.*, and is now, as we were told by Mr. Peacock or Mr. Melville, reduced to 100,000 *l.* I would convert these into five steamers, allotting three to the packet service, and two for general service. I am of opinion that they should be all employed in their turn, so that they may be worn out gradually, in order to be replaced by others of improved construction From these two sources I gain five vessels, or 100,000 *l.*: the total deficit is 110,000 *l.*; deduct five vessels from existing establishments, 100,000 *l.*; remaining deficit, 10,000*l.* But there is also the King's navy, which at present is totally unemployed and maintained at a considerable expense. There can be no reason why a great steamer, capable of transporting troops or or tugging troop-ships, such as are attached to the naval force in the West Indies and the Mediterranean, should not also be added to the East India station; nor is there any reason why the royal navy should not take its share of the duty in the Persian Gulf. Three successive admirals have entertained this opinion. In fact, the whole of the naval force in the East Indies should be consolidated into one, and placed under the Admiralty, by which all distinction of Campany's and King's government would be done away with, much efficiency gained, and much money saved.

1939. Are those calculations founded upon such data as you think are fairly to be relied upon?—I think they are.

1940. Your Lordship has given a great deal of attention to this subject while you were in India?—I have.

1941. Had you come to pretty much the same conclusions as are stated in the paper, with regard to that expense, when you were Governor-general of India?—No, I cannot say that I had.

1942. It is since your Lordship's arrival in England you have furnished yourself with the materials on which you have come to that conclusion?—Certainly.

1943. Has any portion of your opinion thereon been founded on the improved state of science, with reference to steam-boats?—Certainly, very much; I was not aware at all what steamers could do, till I came to ascertain the facts, and I have obtained more information during this inquiry than I possessed before.

1944. Your Lordship has stated that you think the Bombay marine should be altogether done away with, in order to devote whatever expense is now incurred for that object to the establishment of a steam communication?—Yes.

1945. One witness who has been examined on this Committee stated, that he thought that, in addition to the steam-boats that would be necessary for a flotilla, it would be advisable there should be a certain number of steamers, and a few only of the sailing vessels?—Two, he stated.

1946. Is your Lordship of opinion he is correct in that?—I do not conceive that the number he stated as necessary for the Persian Gulf to be correct, and I give this as a reason: he said that the four sailing vessels were sufficient for that purpose. Now, I conceive that a steamer and one vessel would be very much more efficient for the prevention of piracy than four common sailing vessels.

1947. Can your Lordship state any opinion as to the size of the steamers it would be advisable to employ in the Indian seas?—I should have them all of the same size as the Berenice; I think if they could be still larger it would be better. Her Majesty's steamer the Medea seems to be preferred by the best informed of the witnesses; but I am disposed to think that vessels of 1,000 tons would be the best adapted to this service; for convenience, certainly, of making the voyage under all circumstances; decidedly, for profit in the returns.

1948. Have the goodness to state whether you think the stations for the steam packets should be where the stations for the depôts of coal are?—The stations for the steam packets should be, starting from Calcutta, at Galle, Socotra, Mocha or Camaran. There might be subsidiary depôts of coal at the Maldives, at Perim, or any other intermediate port that might be determined on. I consider that Socotra should be the point of junction for the two vessels from Calcutta and Bombay.

1649. In what manner would you have the routes of the steam-boats divided; how far should one steam-boat go, and how far another?—It is the unanimous opinion of all the evidence that the steamers should be changed as often as possible. Therefore, the Calcutta steamer should not go further than Point de Galle; the Point de Galle steamer should be changed at Socotra, the Socotra steamer, at Camaran; in short, I would have three changes in the voyage.

1950. From your Lordship's experience, and your opportunities of inquiring when you were in India, and also in the passages you made on the Indian seas, connected with what you have since learned, you do not see any difficulties which may not be easily surmounted, with reference either to the ordinary state of navigation, or even the south-west monsoon?—When I was in India I certainly had doubts upon the subject; but since I have returned, and have made all the inquiries I have respecting it, and ascertained what steamers with large tonnage and adequate power can effect, I do not think there is the least difficulty in the world. I think a voyage from Galle to Socotra, against the south-west monsoon, is more easy than that from Bombay to Socotra; but by running to the southward from Bombay, a steamer would fall exactly into the track of the Galle vessel. In point of time, the voyage round by Galle to Calcutta would be made in nearly the same as by sea from Socotra to Bombay, from thence overland to Calcutta; the route all the way by sea would perhaps be more regular and certain, because during the monsoons, there are interruptions by land. The voyage by sea might perhaps be two, three or four days quicker; but I do not think it is a matter of any consequence. I think the advantage of the comprehensive plan is that, besides the general convenience, passengers would contribute a great proportion of the returns: a considerable part of the expense, even in the outset, would be paid from this source.

1951. Do you think that, supposing the scheme were carried into effect, the great mass of Europeans going to and returning from India would prefer the short to the long voyage round the Cape of Good Hope?—I have had no doubt of it; I think also there would be a very considerable addition to the number of passengers; at present all the passengers to India come from the United Kingdom exclusively; whereas I conceive that, from the continent of Europe, and from the tide of travellers generally, you will have a very great addition of numbers by the Red Sea to visit India.

1952. Your Lordship was understood to say, on other occasions besides this, there is in India among the European residents universally, and partially among the natives, a very general demand for the establishment of this extended communication?—It is universal among Europeans, and has spread also among the natives. Half of the 30,000*l.* that was subscribed in India for the furtherance of steam navigation with England came from natives; and although a part of the sum may have been given by the persuation of Europeans, still I believe a very considerable proportion of that flowed from their own conviction of the benefit India might derive from being brought into a closer connexion with England, both commercially and politically.

1953. If some such scheme as that you recommend should not be carried into effect, in your opinion a great dissatisfaction will ensue?—There is no doubt of it; and the subject has been entertained in India now during the last five years. For three years of that time I was in India, and I can state the very general and intense desire for it among all ranks and classes; and I may perhaps state here, that nobody was more anxious about it than the Bishop of Calcutta; it was his opinion that it would tend very much to the extension of Christianity in India, and the general improvement of India; that opinion he expressed at a public meeting, and he has frequently expressed the same opinion to myself.

[Adjourned to To-morrow, at Half past One o'clock.

Veneris, 14th die Julii, 1837.

MEMBERS PRESENT.

Mr. D. Barclay.	Mr. Hutt.
Right. Hon. Lord William Bentinck.	Mr. Mullins.
Mr Gordon	Lord Sandon.

RIGHT HON. LORD WILLIAM BENTINCK, in the Chair.

The Right Hon. Lord *William Bentinck,* Chairman of the Committee, further Examined.

1954. Lord *Sandon.*] Do you consider that a speedy and regular communication by steam with all the ports in India will be productive of any moral or political advantage?—Very many, and very great. With respect to the moral advantage, I have already had the occasion, in India, of publishing my opinion; and I will now repeat it. The subscribers to the Madras Steam Fund addressed me a letter, in 1834, in which they stated their belief that this project would confer vast and incalculable benefits upon our country and mankind. I answered as follows: "I confess that my anticipation of the expected benefit goes far beyond the more obvious results, great as those undoubtedly would be, of improved government, of the welfare of the people, as effected by such improvement, of the promotion of commerce, and of what may be considered of minor importance, of the comfort of our own numerous countrymen, separated by such great distance of time and place from all connexion with their dearest interests. The limit assigned by the resolution is expressed by the large term of 'mankind,' and in my judgment appropriately and correctly; because the great want of this eastern world, India, China, &c., may be comprehended in the single word, 'knowledge.' If the moral condition and happiness of the most enlightened countries suffer from this cause, it can be easily conceived, that on this great space, where the human mind has been buried for ages in universal darkness, the task must be hopeless, unless the same means which have alone accomplished the object elsewhere are brought into action, and these means increased and enforced with all the encouragement that the Government authority can bestow. I look to steam navigation as the great engine of working this moral improvement. In proportion as the communication between the two countries shall be facilitated and shortened, so will civilized Europe be approximated, as it were, to these benighted regions; and in no other way can improvement in any large stream be expected to flow in. Past experience shows what we have to expect for the future. I shall take the liberty of enlarging upon this topic. For much more than half a century the British dominion has been established at the three Presidencies, over a great extent of territory, with a large dependent population. Examining attentively the intellectual condition of these numerous communities, it cannot be denied that little progress comparatively has been made in the acquisition of useful knowledge. There prevail throughout, as in the darkest ages of European history, the same ignorance and superstition, the same belief in witchcraft, the same confidence in charms and incantations, the same faith in astrology and omens, the practice of human immolation of all sexes and ages and many other barbarous customs, opposed to true happiness, and repugnant to the best feelings that Providence has planted in the human breast. Again also, in the arts and sciences, in every branch of useful attainment, the ancient usages and learning retain their unimpaired sway. In medicine and surgery, in chemistry, in hydraulics, in mechanics, in civil engineering, in painting, sculpture and music, we observe them all, with the exception of a few individuals of superior talents and ambition, remaining stationary in their primitive rudeness and ignorance. And yet, during this long interval, thousands of well-educated Europeans, deeply versed in all these branches of knowledge, have been succeeding each other, and domiciliated for years in the country. Why, it will be asked, had all this science, this learning, and this ability to impart instruction, passed away without leaving any trace or impress on the mind of India, although in no other part of the world does there exist greater quickness of intellect, a more eager thirst after knowledge or superior aptitude to acquire it? The answer to this question is plain and obvious. The cause is to be found in the past principle of our rule, of rigidly precluding the free admission of Europeans to India; the direct consequence of which, whatever in other respects may have been its advantages, has been to dam up in a great degree the main channel of improvement into India. It may be assumed that 19-20th parts of the importation of Europeans have consisted of the Company's servants; they have had, of course, other duties to perform, occupying the whole of their time, and the fault lies not with them, if they have contributed little or nothing to this object. The government indeed, may perhaps be accused of omission, and of not having done as much as they might; but I doubt, even with more exertion on their part whether, while the same system lasted, much progress could have been made. All the improvements of the description to which I have been adverting, are exclusively due to the skill and enterprise of individuals, aided by the capital of the houses of agency. Every indigo and coffee plantation, the Gloucester mills, the works of every description that are moved by steam, the iron foundries, the coal mines worked after the European fashion, and the other great establishments that we see around us in Calcutta, are so many great schools of instruction, the founders of which are the real improvers of the country; it is from the same sources that we must expect other schoolmasters of new and improved industry. The new character will remove many obstacles, but steam communication far more. But with the opinion that I entertain, that the extent of colonization, (as it is mistermed,) and the effects of it, have been very much overrated, I am convinced that the knowledge and instruction so much needed by India can never be sufficiently provided by European colonists and speculators only. The natives themselves must be encouraged to go to Europe, there to study in the best schools of all the sciences. This opinion I know to be entertained by some of the intelligent members of a committee now sitting at Calcutta, to consider the best means of educating the natives in the higher branches of medicine and surgery. The Pasha of Egypt has given a noble example in this respect to the rulers of rude and unlearned nations. The circumstances that have hitherto operated as a complete barrier against the intercourse of the natives with Europe, except the classes of sailors and of menial servants, have been, first, certain customs as to food prescribed by the Hindoo religion; and secondly, and mainly, the length, the expense and apprehension also of so long a voyage. In respect to the first of these obstacles, Ram Mohun Roy, who will be of illustrious memory among his posterity, has broken the ice; and I know that some, and I have no doubt that other, rich and well-educated natives preparing to tread in his footsteps, with the same laudable desire of seeing what India may become, by what Europe and especially England, is; and of raising their country by the same means from the moral and political degradation in which she is plunged. With respect to the second obstacle, which makes the attempt almost impossible to the great class of students, however willing, to those who are to be the practical operatives and the introducers of the new arts and sciences, and will become the best teachers of their countrymen, steam navigation, with the aid of Government, and of those interested in India's welfare, will go far to remove it. I was happy to learn from the same members of the medical committee, that natives thoroughly acquainted with the English language would, if assisted, be ready to embark immediately in that pursuit, and necessarily in others of the same utility. I will, therefore, conclude this too long detail by saying, that it is knowledge that is needed; knowledge is the beginning of wisdom; knowledge alone can raise this country to a higher standard among the nations of the world; and with the sentiments I have expressed, of the best and most effectual mode of attaining these great purposes, the steam committee are amply borne out, according to my firm conviction, in their resolution, 'that this project opens vast and incalculable benifits to our own country and to mankind.' The principal political advantages, I will shortly state: First, great increase to our military power. The vast space we have to occupy and defend, and the consequent impossibility of quickly transporting troops from one point to another, has led to the necessity of having upon each portion of our territory a force sufficient for its protection, independent of all extraneous assistance. It is evident that, India forming a peninsula, and the moonsoons offering no impediment to the access of steamers, large means of transport of this kind could always convey troops to the point menaced, and the whole army could thus be made available for the service of every portion of our dominions. The last overland mail brings an account of the arrival of the Atalanta at Bombay, and of her being dispatched three days afterwards with a whole native regiment to Mangalore, the seat of an insurrection. In Bengal, the river steamers will convey a reinforcement in three weeks, and safely, to Allahabad, situated at the junction of the Jumna and Ganges, and the central point of the upper and lower provinces of Bengal, which by the ordinary boats of the country could not have been done in less than as many months, and without much risk, the insurance to Allahabad being equal to that upon a whole voy-to England. When in India I recorded the opinion, which I repeat, that had the establishment of steamers now proposed been then in existence during the Burmese war, many thousands of lives, prodigious individual suffering, and millions of money, would have been saved to the state. It is not too much to assert, that under the peculiar local circumstances of India, with great space, no roads or canals, a very unhealthy climate, and with a sea-coast for its universal limit, one-fourth of the same military force, in co-operation with an adequate steam establishment, would be more efficient than the whole without it. If, moreover, the Pasha of Egypt could be induced, as some well-informed witnesses seem to consider practicable, to allow the passage of our troops through his country, a regiment or more from Malta might reach Bombay in five weeks all this is power exercised in its most imposing character. Hyder Ally is said to have declared, that it was not what he saw, but what he did not see, that he was afraid of. I beg leave to put in an extract from a letter (vide Appendix) from the superintendent of steam vessels in the Ganges, upon the great success of that establishment, and as affording a certain degree of expectation of a similar result to the sea-going steamers. Secondly; the civil functionaries, who now come to India so young as to have acquired little European useful knowledge, and necessarily, from position, too apt to contract arbitrary feelings and habits would have easy means and should be encouraged to visit Europe, there to acquire liberal notions of the principles and practice of improved administration. Thirdly; the same salutary influence would operate upon our military officers. Subordination would be greatly promoted by the knowledge that the authority of the superior power at home could be quickly interposed nor would courts martial have the same reluctance to do their duty, if all those considerations which distance so injuriously creates were removed. The comfort, the allegiance, the attachment of all to their native country, would be more firmly maintained. Fourthly; but perhaps the most important benefit of all, would be its tendency to place the security of our empire upon the only solid foundation, the general good will of those we govern. Our present position is this: we have conquered the whole of India: we have much above 100,000,000 of men under our direct and indirect rule; and it is universally allowed that our government has no hold upon the attachment of the people. I will introduce here, as more deserving the attention of the Committee than any opinion of my own, an extract from a minute of one of the most sagacious statesmen that India, or indeed any other country, has produced, the late Sir Thomas Munro, written in 1824, describing the effects of our government. 'If we make a summary comparison of the advantages and disadvantages which have occurred to the natives from our government, the result, I fear, will hardly be so much in its favour as it ought to have been. They are more secure from the calamities both the foreign war and internal commotion; their persons and property are more secure from violence; they cannot be wantonly punished, or their property seized by persons in power; and their taxation is on the whole lighter;' (my experience cannot confirm this latter opinion); 'but, on the other hand, they have no share in making laws for themselves, little in administering them, except in very subordinate offices;' (some amelioration has taken place in this latter respect, but not much,) 'they can rise to no high civil or military station; they are everywhere regarded as an inferior race, and oftener as vassals or servants than as the ancient owners and masters of the country." This minute is full of able, wise and enlightened principles, and the same sentiments will be found to prevail in the recorded documents of two other most able and distinguished individuals, Sir John Malcolm and the Hon. Mount Stuart Elphinstone. Sir Thomas Munro observes also, ‘ It is not the arbitrary power of a national sovereign, but subjugation to a foreign one, that destroys national character and extinguishes national spirit.’ Successsive foreign domination under Mahommedan emperors, for centuries, has been the sad lot of India ; and it ought to have been a happy change in her fortunes, and no doubt will be, that she has become subject to a civilized, enlightened and Christian nation; but so far she has gained little by the transfer, except general peace and tranquillity, and the consequent capability of receiving the benefits of improved institutions and government. In many respects the Mahommedan surpassed our rule; they settled in the countries which they conquered; they intermixed and intermarried with the natives; they admitted them to all privileges, the interests and sympathies of the conquerors and conquered became identified. Our policy, on the contrary, has been the reverse of this; cold, selfish and unfeeling; the iron hand of power on the one side, monopoly and exclusion on the other. The bane of our system is not solely that the civil administration is entirely in the hands of foreigners; but that the holders of this monopoly, the patrons of these foreign agents, are those who exercise the directing power at home; that this directing power is exclusively paid by the patronage; that the value of this patronage depends exactly upon the degree in which all the honours and emoluments of the state are engrossed by their clients to the exclusion of the natives. There exists, in consequence, on the part of the home authorities, an interest in respect to the administration precisely similar to what formerly prevailed as to commerce, directly opposed to the welfare of India; and consequently it will be remarked without surprise, that in the two renewals of the character that have taken place within the last 25 years, in the first, nothing was done to break down this administrative monopoly, and in the second, though a very important principle was declared, that no disability from holding office in respect to any subjects of the Crown, by reason of birth, religion, descent or colour, should any longer continue, still no provision was made for working it out; and, as far as is known, the enactment has remained till this day a dead letter. India, in order to become an attached dependency of Great Britain, must be governed for her own sake, not for the sake of the 800 or 1,000 individuals who are sent from England to make their fortunes. They are totally incompetent to the charge, and in their hands administration, in all its civil branches, revenue, judicial, and police, has been a failure. Our government, to be secure must be made popular, and to become so, it must consult the welfare of the many, and not of the few : the government must remain arbitrary, but it may also be, and should, paternal. But how can this be effected? England has no knowledge of and no care for India. India, again, has no presentatives in England, and has hitherto had no access to her shores; her fate is entirely in the hands of the two authorities with whom her management is vested. The court of directors seek their office for the sake of the patronage only; for the most part they are strangers to India; have their own separate affairs to manage; are divested of reponsibility; but from their permanency, and the knowledge which they derive from their numerous clients, they possess a power and influence over all affairs, which a temporary president of the board of Control, unaided by any board possessing local information, cannot possibly control. It is much to be regretted, when the last charter was renewed, that these two bodies had not beeen amalgamated into one department, with a Secretary with a Secretary of State at its head, with a competant board like that of the Admiralty, possessing local experience and information; chosen perhaps jointly, by the East India Company and the Crown, or Parliament, and paid out of the Indian revenues. It is through the means of a quick, safe and frequent communication between all India and England, that the natives of India in person will be enabled to bring their complaints and grievances before the authorities and the country, that large numbers of disinterested travellers will have it in their power to report to their countrymen at home the nature and circumstances of this distant portion of the empire. The result, I hope, will be to rouse the shameful apathy and indifference of Great Britain to the concerns of India; and by thus bringing the eye of the British public to bear upon India, it may be hoped that the desired amelioration may be accomplished. The following remark of Mr. Mill in his able history of India, is well suited to the present question: ‘ If the East India Company have been so little successful in ameliorating the practical operation of their government, it has been owing chiefly to the disadvantage of their situation, distant, a voyage of several months from the scene of action, and to that imperfect knowledge which is common to them with all their countrymen."

REPORT.

THE SELECT COMMITTEE appointed to inquire into the best Means of establishing a Communication by Steam with *India* by way of the *Red Sea*, and to whom the several Petitions upon that subject were referred, and who were empowered to report their OPINION and the MINUTES OF THE EVIDENCE taken before them;---HAVE, pursuant to the Order of The House, examined the Matters to them referred, and have agreed to the following REPORT:

THE sudden termination of the Session having deprived Your Committee of the opportunity of that full investigation of the subject which it might otherwise have received, it is with some diffidence they present to The House the impressions which the valuable and important Evidences brought before them, and to which they beg leave to call the particular attention of The House, has produced upon their minds.

Your Committee have learned with much gratification that arrangements have been entered into between Her Majesty's Government and the East India Company for the establishment of a Monthly Communication by Steam from Suez to Bombay, and they hail with satisfaction the liberal spirit in which the Court of Directors have met the propositions of Her Majesty's Government for thus affording a direct intercourse with one portion of the continent of India, and facilitating a communication for Letters with all the Presidencies.

That inasmuch as, in the opinion of the witnesses who have appeared before Your Committee, a direct communication by Steam from the Red Sea to Ceylon, Madras, and Bengal, would be practicable at all seasons of the year by the employment of vessels of adequate tonnage and power; and as, under judicious arrangements, such extended establishment would appear to offer a prospect of an adequate return for the increased outlay, by the conveyance of Passengers, and of some valuable articles of Merchandize, which cannot be expected from the limited communication with Bombay alone; Your Committee feel bound to recommend a continued and zealous attention to the subject on the part of Her Majesty's Government and the East India Company.

But strongly as Your Committee are impressed with a sense of the advantages, Political, Commercial, and Personal, which would arise from the more extended system of communication, they would earnestly deprecate any interruption of the valuable arrangements now in progress, with which it appears to them, from the Evidence adduced, to be perfectly compatible.

July 15*th*, 1837.

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COMPARISON of the Performance to be expected from the proposed Indian Steam Vessels, with the ascertained Performance of other Sea-going Vessels of admitted excellence.

VESSELS' NAMES.	Builder's Measurement.	Nominal Power.	Tons Measurement, per Horse Power	Tons of Displacement per Horse Power.	Area of Immersed Section.	Average Velocity per Hour.
	Tons.	Horses.				Knots.
Medea, Admiralty steamer	840	220	3·818	5·59	1·61	8
Gulnare, Sardinian Admiralty steamer	320	90	3·55	3·78	1·84	9½
Transit, Commercial Company	282	80	3·57	4·75	1·657	8
Blazer, Admiralty steamer	533	120	4·358	5·175	2	7¾
Leonidas and Tancrede, French Government	600	100	3·75	4·38	1·233	Bad Weather. 8·08 in the Bay, in the Ocean 8·936 in the Mediterranean.
Proposed Vessels, Indian steam	620	180	3·44	4	1·22	

N. B.—The average speed of the Medea and that of the Gulnare has been obtained from their performance in the Mediterranean; that of the Transit is principally from her performance in the Bay and in the Atlantic, the average of the Blazer is that of her performance in the Bay, in the Ocean, and in the Mediterranean. The masting of the Medea and of the Blazer very sensibly affect their performance as steamers.

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REPORT

ON

STEAM COMMUNICATION WITH INDIA.

REPORT

OF

THE COMMITTEE

ON

STEAM COMMUNICATION WITH INDIA,

VIÂ

THE RED SEA;

TOGETHER WITH THE

MINUTES OF EVIDENCE, PROCEEDINGS,

AND APPENDIX.

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LONDON:
SMITH, ELDER AND Co., 65, CORNHILL.

1839.

AT A PUBLIC MEETING, CONVENED BY CAPTAIN BARBER, 12TH OCTOBER, 1838:

The Right Hon. Sir ROBERT WILMOT HORTON, Bart., late Governor of Ceylon, in the Chair,

To take into consideration the best mode of effecting a Steam Communication with India, *viâ* the Red Sea, on a most comprehensive plan, by private capital and enterprise, the following Resolutions were put, and carried unanimously:—

Moved by Sir John Rae Reid, Bart., M.P., seconded by James Mackillop, Esq., and carried *nem. con.*;

1. This Meeting is unanimously of opinion that the present means afforded for overland intercourse with India is totally inadequate for commercial purposes, and that for social purposes, it has entirely failed to fulfil the just expectation of the people, both of England and of India.

Moved by T. A. Curtis, Esq., seconded by Henry Gouger, Esq., and carried *nem. con.*;

2. That the plan submitted to this Meeting by Captain Barber ought to be taken into consideration, and if the details therein, on examination by competent persons, should be declared to be founded on a solid basis, calculated to give stability and permanency to the undertaking, that it will be worthy of support and encouragement from the mercantile community of Great Britain, and other parties interested in approximating India to the mother country.

Moved by the Right Hon. Lord William Bentinck, M.P., seconded by Sir John Rae Reid, Bart., M.P., and carried *nem. con.*;

3. That a committee be appointed to investigate the plan submitted to the Meeting by Captain Barber, as also any other suggestions that may be submitted to them for establishing a Steam Communication with India, *viâ* the Red Sea, on a comprehensive plan, and that the following Gentlemen form a Committee, with power to add to their number:—

JOHN BAGSHAW, ESQ.
WILLIAM CRAWFORD, ESQ., M.P.
T. A. CURTIS, ESQ.
HENRY GOUGER, ESQ.
J. P. LARKINS, ESQ.
JAMES MACKILLOP, ESQ.
CAPTAIN A. NAIRNE, H.C.S.

J. H. PELLY, ESQ.
JOHN PIRIE, ESQ., ALDERMAN.
CHRISTOPHER READ, ESQ.
JOHN SMALL, ESQ.
ROBERT THURBURN, ESQ.
MAJOR TURNER.

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REPORT.

THE COMMITTEE appointed at the Public Meeting on the 12th October 1838, to investigate the question of STEAM COMMUNICATION, have agreed to the following REPORT:

YOUR Committee having attentively considered the various plans for the establishment of Steam Communication with the Presidencies of India and Ceylon, viâ Egypt and the Red Sea, by means of a private Company, together with the explanations and suggestions submitted to them in the course of that investigation; and having had the advantage of much information on sundry points relating to the general subject of inquiry, are strongly impressed with the importance so justly attached to this great and interesting object.

Your Committee are of opinion, that a monthly communication, combining regularity and despatch, so ardently desired, but hitherto so unsuccessfully attempted, may be effectually secured through the instrumentality of a private association, and that by such agency alone can it be accomplished.

To establish and maintain this communication, the Committee consider that seven vessels, viz., four for the Indian, and three for the European side, of not less than 2,000 tons each, and 500 horse-power, with the necessary accommodation boats on the Nile and Mahmoudee canal, will be required; and from the information before them they believe that these vessels may be built and equipped in the very best manner, including machinery of the most approved description; that the various depots for coal, and all other needful buildings may be provided, on a gross outlay of 520,000*l.*; and that the annual expenditure on the undertaking, including interest upon the 520,000*l.*, at 5 per cent., with 21 per cent. for insurance and wear and tear, with charges for management in Europe, Egypt, and India, may be estimated at 250,000*l.*

In order, therefore, at once to place the undertaking in a position of undoubted efficiency to carry out the scheme with perfect success, your Committee recommend that the Capital of the proposed Company should not be less than 600,000*l.*

To meet the annual disbursement, your Committee consider that the Projectors should look for returns from the following sources, viz.: passengers, periodicals, specie, and valuable light parcels, and an annual payment from Her Majesty's Government and the East India Company, for carrying the mails and despatches to and from the several Presidencies of India and Ceylon, and for a monthly conveyance of the mails to and from Gibraltar, Malta, and Alexandria.

Your Committee purposely refrain from specifying any amount of income to be reckoned upon from these sources. It appears, however, from approved data, that from 3,500 to 4,000 persons pass annually between India and the United Kingdom; and it may, therefore, fairly be assumed, that a large proportion of that number will avail themselves of the superiority of accommodation, and the certainty and rapidity of conveyance which such a company would assure to them. The Committee look also for a considerable annual sum from the conveyance of specie, periodicals, light parcels, &c.; and they feel themselves justified in the expression of their belief, that the return from these sources will annually increase.

With respect to the last source, your Committee are decidedly of opinion, that any Company, formed with an adequate capital for the purposes of carrying out the contemplated communication, would be entitled to receive an annual sum from Her Majesty's Government and the East India Company, for a limited period, not only for conveying the mails and despatches, but also in consideration of the vast benefits, political, social, and commercial, which such international communication cannot fail to confer.

In the size of the vessels proposed, your Committee have considered, not only the accommodation essential to the comfort of the passengers who form the principal source of return, but also the complete adaptation of the vessels for other service, should any contingency arise to interrupt the course by the Red Sea.

As one of the inducements to the Red Sea route will be the comparative shortness of time in which the several passages to and from the respective Presidencies in India can be accomplished, the following table may be taken, to shew the extent of time to be occupied on the passage:—

England to Alexandria, including touching at Gibraltar and Malta	15 days.
Passage through Egypt to Suez	5
Suez to Bombay	15
	— 35
England to Suez	20
Suez to Ceylon	18
Ceylon to Calcutta, touching at Madras	7
	— 45

In the homeward voyage some allowance is to be made for quarantine: but your Committee have to observe that the steamer will not perform it at Malta or any other intermediate port, but on arrival in England, and they confidently anticipate that agreeably to the custom which obtains in Her Majesty's service, the duration of quarantine will be diminished by the number of days occupied on the passage from Alexandria to England. So that the objection which only applies to the homeward voyage, will not generally affect the computation beyond an additional five days.

In consequence of its forming part of the plan submitted by Captain

Barber to the Committee, a considerable portion of their attention in the course of the inquiry was directed to the subject of Iron steam-boats; but notwithstanding the strong testimony borne to the increasing advantages which are anticipated from the substitution of iron for wood in the construction of steamers, and generally in marine architecture, the Committee do not feel that present experience warrants their recommending its adoption for vessels of the class, and for the distant employment contemplated in the plan recommended in this Report.

Your Committee carefully abstain from offering any opinion which might lead to the indulgence of unauthorised expectations of profit, but they have no hesitation in expressing their belief, that, with the sources of return already adverted to, and under efficient management, the project may be carried into effect with undoubted important advantages to India and to the United Kingdom and with every prospect of a reasonable Return for the capital employed.

In concluding their Report, your Committee desire to record the sense of obligation which they feel to the Right Hon. Lord W. Bentinck for his readiness in favouring them with the plan contemplated by His Lordship; they likewise sensibly appreciate the information afforded by the several Gentlemen who were so good as to comply with the Committee's request to attend for that purpose; and they feel it to be especially due to Captain Barber, to bear testimony to the zeal manifested by him in discharging the trust reposed in him by the Bengal Steam Fund Committee, as well as to the valuable assistance he has afforded throughout the proceedings of this Committee.

London, 18*th January*, 1839.

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MINUTES, PROCEEDINGS, &c.

Wednesday, 17 *October*, 1838. 17 *October* 1838

At a Preliminary Meeting of the Committee to enquire into the best means of adopting a Steam Communication with *India*, *viâ* the *Red Sea*, on a comprehensive plan :

PRESENT.

Mr. T. A. Curtis.	Mr. Henry Gouger.
Capt. J. H. Pelly.	Mr. R. Thurburn.
Mr. C. R. Read.	Major Turner.
Mr. J. Mackillop.	Mr. John Pirie, Aldm.
Mr. J. Small.	Capt. Nairne, H. C. S.
Mr. J. Bagshaw.	Mr. J. P. Larkins.

T. A. Curtis, Esq., was elected Chairman, and Major Turner Deputy-Chairman of the Committee. The Right Honourable Sir R. W. Horton, Bart. was elected Honorary Member of the Committee.

Mr. P. Auber	Major Oliphant
Mr. P. Stewart	Captain Henderson

Were elected Members of the Committee.

On the motion of the Chairman, Mr. P. Patrick was appointed Honorary Secretary to the Committee.

Captain Barber requested to be allowed to attend the Committee in the capacity of "Agent to the New Bengal Steam Fund Committee," and begged further to observe that he should at all times be most happy to afford this Committee every information and assistance in his power. His object was to have a full enquiry into every detail, whether offered by himself or others, and that the Committee should adopt that plan, which, upon due consideration, they deemed best, without reference to his scheme in particular. His object was to obtain for his constituents a full and comprehensive Steam Communication.

(*Adjourned.*)

Friday, 19 *October*, 1838.

PRESENT.

Sir R. W. Horton, Bart.	Mr. Henry Gouger.
Mr. J. Bagshaw.	Major Turner.
Mr. J. Mackillop.	Mr. C. R. Read.
Mr. John Small.	Mr. J. P. Larkins.
Mr. J. H. Pelly.	Mr. John Pirie, Aldm.
Mr. R. Thurburn.	Captain Nairne, H. C. S.

T. A. CURTIS, Esq., CHAIRMAN.

Lord *W. Bentinck.*
——
19 *October* 1838.

Lord William Bentinck was present by invitation, and read the following correspondence between himself and the India Board, and the Court of Directors.

(Copy.)

" To the Chairman and Deputy Chairman of the East India Company.

" THE interest which I take in securing to her Majesty's Indian territories, under the government of the East India Company, the full benefit of Steam Communication, will, I trust, be received by you as my apology for thus trespassing upon your attention.

" Having been entrusted with the charge of advocating the earnest and reiterated wishes of the British and Native community, for the full and complete extension of such communication to India, I feel no hesitation in addressing you as the heads of the executive branch of the home administration, in the full confidence that the Court of Directors will receive with satisfaction any proposition calculated to attain this most desirable object.

" The petitions, which I have lately presented to the House of Commons, sufficiently attest the truth of the conviction expressed by the President of the Board of Controul in his letter, dated the 10th of March 1837, addressed to the Chairman and Deputy Chairman of the Court of Directors, that any plan which does not embrace communication to Madras and Calcutta, as well as with Bombay and Ceylon, will certainly fail to give public satisfaction, and to fulfil the just expectations both of the people of India and England.

" The greatest disappointment prevails throughout India in consequence of the delay in carrying out those intentions.

" But independently of the inadequacy of a communication which has its terminus at Bombay, for either social, commercial or political purposes, it is impossible that it can be beneficially conducted by so many different authorities, none of whom are responsible for the unbroken continuity of the present route, while it is carried on at a very great public charge.

1. The Calcutta Dak to Bombay.
2. The Bombay packet to Suez.
3. The Egyptian transit with the conflicting interests of the public authorities and private agency.
4. The Admiralty Branch Packet to Malta.
5. The Admiralty Branch Packet from Malta.
6. The Peninsular Steam Navigation Company's Packet to and from Gibraltar and Falmouth.

" The uncertainty of the dispatches from India, the defective arrangements in Egypt, the length of the quarantine, which might be avoided, and the delays on the European side are subjects of general complaint.

" After maturely considering the question in all its bearings, and being fortified in the opinions I have formed by the concurrent judgment of competent parties, I am convinced that Steam Communication, on the most comprehensive scale, may be extended to the several Presidencies, including also the island of Ceylon, *viâ the Red Sea*, in the most satisfactory manner, and at far less cost than is incurred under the present incomplete arrangement.

' I appreciate the disposition that has been manifested by Her Majesty's Government, and by the Court of Directors in the support hitherto given to this important measure; but the undertaking is more fitting the enterprise of a Private Company, than one legitimately falling within the province of the Ruling Authorities. At the same time, from the peculiar position in which British India stands towards England, no Company can be formed with any reasonable hope of success; unless supported for a time by pecuniary aid from such authorities.

" I beg therefore, to ask, whether, in the event of a Company being formed for carrying on Steam Communication between England and India, which shall afford the most ample means of conveying, within the shortest possible period, all Dispatches, Diaries, and Consultations from the Government of India and convey Dispatches from the Home Authorities to those Governments; as well as present ample accommodation to passengers, the Court of Directors, and Her Majesty's Government, will be prepared to pay an amount certainly, not exceeding two-thirds of the present charge, for a term of seven years; at the expiration of which period, the agreement to be open to revision, if it shall appear that reasonable grounds exist for a remission, by the Steam Company, of any portion of the aid now sought.

Lord W. Bentinc

19 October 1838

"By this arrangement, a large annual saving will accrue at once to the Government: while the anxious desire, so repeatedly pressed upon the attention of the Home Authorities, will be completely and satisfactorily met.

"As I shall be prepared to take a prominent part in the conduct of such a Company, provided my proposition is favourably received by Her Majesty's Government, and by the East India Company; and as I can confidently assert that the greater part of those with whom I am associated, have exclusively in view the prosperity of India, I trust that in these motives will be found a sufficient guarantee, that the principles upon which such a Company shall be based, and carried forward, will be unexceptionable.

"Being pressed to make known to India the steps which I have taken to discharge the trust reposed in me, I may be allowed to request as early a reply to this communication as circumstances will permit."

"I have the honour to be,
"Gentlemen, &c.

Park Place,
14th August, 1838.
(Signed) "*W. C. Bentinck.*"

(Copy.)

From the Court of Directors to Lord William Bentinck.

"My Lord,

"The Chairman and Deputy Chairman of the East India Company having laid before the Court of Directors your Lordship's letter, dated 14th ultimo; in which you request to be informed, whether the Court and Her Majesty's Government would be disposed to afford pecuniary aid to a company, to be formed for conducting the Steam Communication between England and India; I am commanded to acquaint your Lordship, that, while the Court have every disposition to entertain favourably any proposition which may conduce to the public interests, and duly appreciate your Lordship's zeal for the prosperity of India, to which feeling alone they are confident that the proposal under reply is to be ascribed; yet, having so recently undertaken jointly with Her Majesty's Government, the conveyance of the public mails, in preference to that important trust being committed to a private association, the Court are of opinion, that the principle of that arrangement should be maintained; at least until it has had a fair and complete trial, in point both of efficiency and expense.

"At the same time I am instructed to add, that the Court, without pledging themselves to the final adoption of the measure, will be happy to receive from your lordship any detailed information in illustration of your proposal, which you may be desirous to lay before them.

"I have the honour, &c.
(Signed) *J. C. Melvill*, Sec.

(*Adjourned.*)

Monday, 22 *October*, 1838.

PRESENT.

Sir R. W. Horton, Bart.	Mr. Henry Gouger.
Mr. J. Bagshaw.	Major Turner.
Mr. J. Mackillop.	Mr. C. R. Read.
Mr. John Small.	Mr. J. P. Larkins.
Capt. J. H. Pelly.	Mr. John Pirie, Aldm.
Mr. R. Thurburn.	Captain Nairne, H. C. S.

T. A. CURTIS, Esq., in the Chair.

Captain *James Barber* read the following Paper:

Capt. *J. Barber.*

22 *October* 1838.

Called upon to place before this Committee my plan and estimates for a comprehensive scheme of Steam Communication with India *viâ* the Red Sea, I beg deferentially to submit the following observations:

First—Upon the size, power, and material of the boats to be employed, the estimate of the whole plan depends; and although my opinion at present adheres to vessels of the tonnage and power which I shall now give in, I am aware that they are by many considered to be larger than is at present

Capt. J. Barber.

22 October 1838.

required to perform the service for which they are intended; and that to provide them would consequently lead first to a greater outlay of capital; and secondly, to a larger amount of disbursement than is necessary to obtain the object in view; viz., that of effecting by the most economical means, (consistent with regularity, security, and dispatch) an effective international communication with all the Presidencies of India, Ceylon, and the Eastern Straits. To facilitate, therefore, the object of this enquiry, and to enable the Committee to arrive at a satisfactory conclusion upon this point; one, which will so very materially govern the whole scheme, I shall, with permission, also place before you estimates for wooden boats of three different sizes and proportionate power; viz.:

One of 1,500 tons and 500 horse-power.
One of 1,250 tons and 350 horse-power.
One of 1,000 tons and 300 horse-power.

The additional trouble in receiving evidence as to the properties of each particular boat will be trifling; while on the other hand it will place before the Committee a comparative estimate of the cost and annual expenditure of each size, together with their relative value in carrying out this undertaking, and thus it will enable the Committee with the least possible labour to arrive at a satisfactory determination as to the most adviseable tonage to be employed.

Secondly—With respect to the material: whether they shall be built of wood or of iron, is a question which the Committee will have to decide. There are many conflicting opinions on this subject, and the time, perhaps, is not arrived when it would be prudent for a new Company to risk their stability and character upon experiment. Still I hope the Committee will receive evidence to that point. It would be useful at some future period to any Company that may result from this enquiry, for when I remember the intense prejudice that existed only a few years ago against the use of iron chain for cables and other purposes of a ship; and when I now see that other material than that is nearly exploded, I am led to believe the time is fast approaching when iron will totally supersede the use of wood in the construction of steam vessels.

Thirdly—Whatever may be the size of the boats selected by the Committee, be they of wood or of iron, I would respectfully but earnestly submit that it be determined on with a view not to one particular vessel alone, but with a consideration that each shall be duplicate of the other in every detail of vessel, accommodation, and machinery.

Lastly—I would observe, it was my intention to have entered more fully into the several points connected with this undertaking, but I think the Committee will see that by so doing, at present I should only enter on explanations that may be profitless, and thus intrude upon their very valuable time. With permission, therefore, I will lay before the Committee the scheme and abstract estimates founded thereon; and will call before you evidence in support of my opinion; and I have to mention to this Committee that I have employed Mr. Holmes, a civil engineer, who has paid great attention to the construction of iron steam-boats of large size; and who has at my charge prepared drawings in detail, to illustrate the mode of fastening, and to show the advantages of iron boats over those built of timber.

Will you now detail your plan to the Committee?

First, the route is to be *viâ* the Red Sea. Secondly, that the communication be monthly between England and India; that it not only include the three Presidencies and Ceylon, but that it shall extend through the Straits to Batavia; that regular periods be fixed for arrival and departure; that passengers shall be accommodated with every possible comfort, at a cost not to exceed the rate at present charged for passage in ships *viâ* the Cape of Good Hope; and that quarantine be performed in England; I think I shall be able to show that at the commencement the communication may be made in thirty-six days to Ceylon, forty to Madras, forty-two to Bombay, and forty-three to Calcutta. To accomplish this, it will require five vessels of 1,500 tons burthen and 600 horse-power, and two smaller

Capt. J. Barbe

22 October 183

ones for the Bombay branch. The boats should be exact duplicates of each other, in every detail of vessel and machinery; that the transit through Egypt be provided for by iron Steam-boats from Alexandria to Cairo, and across to Suez by omnibus and van. The baggage, merchandise and parcels will be packed in sectional cases; a number of which, according to size and weight, will, placed and secured upon a skeleton carriage, form a van; these cases will stow equally well in any of the vessels; so that, in fact, the goods need not be removed therefrom, till they shall have arrived at their place of destination. The distance from England to Alexandria, *viâ* Gibraltar and Malta, is three thousand one hundred miles; and I proposed to employ in this service two boats of 1,500 tons burthen and 600 horse-power. I calculate that each passage will take thirteen days steaming; allow for stoppages one day, making fourteen days; transit to Suez, *viâ* Cairo, five days, making a total of nineteen days. The distance from Suez to Galle is three thousand five hundred and seventy miles. I propose to employ three boats of 1,500 tons and 600 horse-power each; the passage will occupy fifteen days; allow for stoppages two days, making thirty-six days to Ceylon. The distance from Galle to Madras and Calcutta, is one thousand four hundred and fifty miles, six days; allow for stoppages one day, the total being eight thousand one hundred and twenty miles to Calcutta, forty-three days. The distance from Bombay to Point de Galle, is 1,000 miles; and, for this service, I propose to employ two boats of 600 tons burthen and 200 horse-power each. The passage will take five days; allow for stoppages one day, total forty-two days to Bombay.

Have you any explanation to make upon that plan?

I wish to observe, that this is the plan that was detailed at the public meeting, and for which the public meeting was convened. I stated at the first day of meeting of this Committee, and I have stated in the preliminary observations I have made this day, that I am perfectly aware that by a great many people the size and power of the boats is considered too large. My wish is to do my duty to my constituents, carrying out a comprehensive plan of Steam Communication, *viâ* the Red Sea; and if I offer suggestions I do so respectfully, not dictatorially, at any time; and I hope that it will never be considered that any observation I make to this Committee, is made in any but the most deferential way, and with the respect that is due to them. I would then suggest that the first step for this Committee to carry on this plan, or any other plan based upon it, is to come to a determination—first, to the size, power, and number of the boats; for, upon the size and power of the boats, every other calculation must be based.

Would yon recommend boats of the same size for the navigation of the Mediterranean, as for the navigation of the Indian Seas?

Decidedly—and for this reason; that you will not only have the passengers, and the packages and the parcels that shall arrive at Alexandria from all India; you will have, also, when this is established (which are not taken into account) the passengers from China and Batavia. It is true that some may go by the Continent; but I have not the smallest doubt that when the Steam-boat communication is perfected between Alexandria and London, you would also have from Alexandria a great many passengers and packages to and from Egypt, that do not go to India at all. Again,—if a boat be lost in India, you can supply her place immediately, and charter her while you build.

As to the navigation of the Red Sea, will boats, of the size you describe as being desirable for the undertaking in general, be eligible also for navigating the Red Sea.

There are six fathoms of water at Suez, and a channel 60 miles wide up and down the Red Sea, as will be seen by reference to this chart *(producing a chart)*. This is the last chart published by the East India Company.

Then there is no danger from large steam-boats navigating the Red Sea?

Not the smallest.

Are they not too large to go into the Ports where it is proposed to establish depôts?

I propose to establish only one dépôt between Calcutta and Suez; a floating depot. I am not prepared to say where that depot would be placed best; but I feel certain that, upon enquiry, it will be found that one depot will be sufficient; and it will be for the Committee to say where it shall be stationed between Suez and Calcutta. (All the Steam Packet Companies at the present day are exploding small boats, and increasing their power. The General Steam Navigation Company would be too happy to discard all the small boats they have; and for the service the small boats are performing, they would have large boats, being more economical and more secure.)

You do not propose any spare vessel at all; but that those five vessels are to work out all the communication between England and Calcutta?

I think it will be seen by reference to the plan, that even two vessels of this tonnage and power would be enabled to do the work between Suez and Calcutta. It would be easy work for three vessels; in case of any accident occurring to one, the two will certainly carry on the work during the repairs. I do not mean to say that a spare boat would not be very advisable; but I am laying this plan before the public, who are looking at the amount of funds to be subscribed; and therefore, if I add 50,000*l.* to a capital of 335,000*l.*, I encrease it very much with one item. I am convinced, that long before this plan would be perfected, you would have no difficulty in getting funds to put on a spare boat. Moreover, it would require a spare boat; for I feel convinced, that under five years hence the boats will go from London every fortnight.

Is there to be any spare vessel to perform the service between Suez and Calcutta beyond the three vessels mentioned in your plan?

I do not think it is necessary if they are made of that size.

Do you think the vessels will be capable of performing the 40,160 miles during the year, continuous employment?

Clearly so; and particularly starting as new boats.

You have calculated the Insurance at 5 per cent. Have you taken any steps to ascertain that the Insurance can be done at 5 per cent.?

I think it will be found in evidence before the Committee of the House of Commons, that the Insurance upon Steam Vessels is considered to be less than upon others.

Do you think you would insure the boat from Suez to Calcutta and back, at all seasons of the year, for the same rate as you would in the Atlantic?

I think that from here to Alexandria, you would insure them at much less. I think, taking them the year round, boats of this size and power, you would find no difficulty in insuring at 5 per cent.

How do you propose to take passengers and baggage from Alexandria to Cairo?

By the aid of steam tugs round by Rosetta, and some portion through the canal. The passengers would have the accommodation boat, and an iron tug to tug them along the canal; and instead of being eight or ten hours, as they now are, they would go in two or three. With the permission of the Committee, I will be prepared to put in a small map and sketch of that.

You say that you propose to go across to Suez by omnibus and van. Are you aware that Messrs. Hall and Raven have already got a contract for conveying passengers along that line?

I am. Mr. Raven called upon me when in England, and explained that he had done so; and that he hoped if any company should be formed for carrying out the communication, they would take advantage of the facilities which his plan afforded.

Did Mr. Raven imply any difficulty with regard to the possibility of carrying on the conveyance?

Not the smallest It is on the evidence of Mr. Briggs, that you may drive a curricle the whole way.

(*Adjourned.*)

Friday, 26th October, 1838.

PRESENT.

Sir R. W. Horton, Bart.
Mr. P. Auber.
Mr. C. Reid.
Mr. Bagshaw.
Mr. John Small.
Captain Nairne, H.C.S.
Mr. Stewart.
Mr. Mackillop.
Mr. Larkins.
Mr. Gouger.
Captain J. H. Pelley.

T. A. CURTIS, Esq., in the Chair.

Captain Barber was further examined, as follows:—

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Chairman.] You have given in an estimate in round numbers of the outlay which you think will be necessary, amounting altogether to 335,000*l.* Of that 250,000*l.* are for five boats of 1500 tons each, 600 horse power. As you have named boats of a very large size, namely, 1500 tons, will you state what are your reasons for taking boats of so very large a size, when no boats of that size have ever been applied hitherto to that service?

There are several reasons. Whoever undertakes to keep up this communication, it will be the one looked to for regularity and dispatch. To other countries there are various means and opportunities of intercourse, but with India this would be *the* connecting link; I therefore think it absolutely necessary to have boats of sufficient tonnage to secure the object to be obtained. Secondly, to carry the undertaking out with a profit, you must make it embrace every source of revenue. In that respect there can be no doubt but passengers will be its very life-spring. Now to induce passengers to avail themselves of the route by the Red Sea, you must give them something else beside dispatch—you must give them the greatest possible comfort that is to be obtained, even beyond that which is afforded by ships that go round the Cape of Good Hope. In my daily communication with passengers of both services, that is their observation. I can quote even the words —they say, "Give us a comfortable conveyance—let the quarantine be performed in England, and we shall *all* be too anxious to have it established, and will go with you." There is a third reason.—In going to a large outlay you must look to what will be the least possible loss. That is, if any political crisis should compel you to abandon this route—if, for example, there should be a war, I have named those large boats, because they would be proportionably more valuable when devoted to other employments than smaller ones, and they would also be the best class for going round the Cape of Good Hope, should circumstances require it.

You have stated that you require 600 horse-power. Is there any such power existing anywhere now?

I think not. An iron steam-boat of that description has not been built; the power generally given to boats of that size is one in three decrease of power in proportion of tonnage, after you come to 1000 tons. By recent improvements in marine engines, their weight is much reduced, and you must have spare power to overcome resistance of adverse winds and currents if you mean to keep up the speed with the regularity of a mail coach. That is my reason for having a very large power.

Mr. Larkins.] You have said that passengers proceeding by the route of the Red Sea will require more comfort and convenience than those proceeding homeward by the Cape of Good Hope.

It is desirable to give it them in order to bring them into the route. It is to passengers, principally, you must look to produce a profit; and therefore, I think it would be politic to invite them to come, by having accommodation superior to what they can obtain in the ships that go by the Cape.

If you give the same accommodation to families proceeding to India by the route of the Red Sea, is it not evident that you will be unable to accommodate a great many?

I think a boat of the size I have named will take 100 passengers comfortably, giving to some a cabin 12 feet square, and those that like to pay, might have 15 feet square; others would double up, as the custom is at present.

Chairman.] In the statement you have made here respecting 1500-ton ships of 600 horse power, you calculate upon having iron steam-boats?

I do.

Is it within your knowledge that any such iron steam-boat has floated in water?

No. I wish to call Mr. Holmes, a civil engineer, because he would lay before the Committee the details of the construction of an iron boat of that size. The drawing of that boat, I am told, has been examined in detail by Mr. Waterman and Mr. Ditchborne, who are shipwrights employed by Her Majesty's Government. Though they began with great prejudice to observe the detail of this boat, when being constructed on paper by Mr. Holmes, they are now ready to come before the Committee, as I understand, to say, that they have no hesitation in declaring, that a boat of iron so built would be superior in all ways to any wood boat that can be built.

What boat is that?

I am speaking of a plan of a boat of 1500 tons burthen.

Mr. Larkins.] However high your opinion may be of iron boats, do you think it would be prudent in a company of this nature to commence with boats of that description?

I have said not, in the preliminary observations I have made; but I do hope that the Committee will find on enquiry, that it will not be too much that they should have one of those two boats between Alexandria and England, an iron boat.

You think it would be very imprudent in the direction to start with boats of that kind?

To have the whole five so; but I should think not to have one such from Alexandria to England, because I think that experience would convince you of the difference of expence as to the wear and tear, and as to the draft of water. An iron boat weighs very little more than a third of a wooden boat; consequently there will be considerably less immersion.

Mr. *Auber.*] Is not this the first suggestion with regard to iron boats?

No; I have long since considered that iron boats would be the best; but at the public meetings I thought that, looking to the prejudice, not of this Committee, but of the public generally, that I should have to encounter in establishing iron boats, I felt that a Committee would probably decide upon having wooden boats; I, therefore, stated publicly at the meeting, that my outlay would not exceed 400,000*l.*, although 350,000*l.* is taken here for iron boats. Now, if you build them of wood, it will cost 62,000*l.* a boat; and I will give the items. The British Queen, which is considered to be as a Steam ship the best, was contracted for at 15*l.* per ton; I estimate 16*l.* 10*s.*; that is 30*s.* more than the British Queen cost. Her copper will come to 1,500*l.* The engines of the President are contracted for 25,500*l.* She is about the same power, and laid on the same blocks as the British Queen. Then, although it is *my opinion* that the 600 power would be a desirable one, I do not imagine that I shall be borne out in that; and if you reduce it, and make the power 500 horses, you immediately reduce the cost of the engine 5,000*l.*; and therefore this estimate, under any circumstances, will more than meet the demand.

Chairman.] What is the size of the great iron boat that runs between Antwerp and London?

She is the largest iron boat, the fastest and the best on the river. An iron boat keeps so firm, that there is no friction, comparatively, by the working of the vessel.

Mr. *Larkins.*] Are your boilers iron or copper?

Iron;—iron, you will find, upon the evidence of the best engineers, are the strongest and the best, and recommended now with Hall's condenser.

You have put in Hall's condenser?

Yes. Then I give 4*l.* per ton for masts, boats' sails, and anchors, which form an item of 6,000*l.*; for cabin fittings 4,000*l.* The several items added together, make 61,750*l.*, which would be the price of a wooden boat; this I had in view, when I stated that probably 400,000*l.* would be required for the outlay?

Mr. *Auber.*] Do you allow duplicate machinery?

No; I believe it is unnecessary to have duplicate machinery on the European side of the Isthmus; and having conversed with some of the most eminent engineers upon the subject, I think the better plan upon the other side will be to have an entire spare engine. For if you ask an engineer which is the best part to have a duplicate of, he says the part most likely to break; and if you ask him which that is, he cannot tell you that, nor can I tell him. Therefore it would be better to have one whole engine to spare upon the other side, and to keep it supplied as the parts may break.

You consider that iron is equally applicable for boilers upon the Eastern side, as upon the European?

That is my opinion. It will be found that before the Committee of the House of Commons, the evidence was that iron boilers were much stronger; and, with Hall's condensers, they are preferred.

Chairman.] Are there not two opinions upon the subject of Hall's condensers?

I have never heard but one.

You have stated here that there are to be five boats. Are you of opinion that five boats are sufficient?

I have no doubt of it. The largest yearly portion that the boat will have to traverse will be 40,000 miles, at stages of 3,000 each, with intervals of rest of seventeen to twenty days. I have already asked very eminent engineers upon that point, and they say they cannot see the slightest difficulty. You must take into consideration that this is 40,000 miles traversed —not steamed. Every gentleman who has been in India, will know that in the South-west Monsoon, the boat will sail from Ceylon to Calcutta; and at other times, in other places will sail also. But I will even say that she shall steam 40,000 miles; and I am prepared to prove, by the opinions of very eminent engineers, that there will be no difficulty in doing it.

Mr. *Larkins.*] Has it ever been done?

The Medea steamed and sailed 53,000 miles in fifteen months; but I think it is more the work of an engineer to speak to the capability of the engine. The Committee will satisfy themselves upon that point, by the evidence of eminent engineers. I do not go by my own judgment here, but by the opinions and judgment of very eminent engineers.

Mr. *Auber.*] At present there are no vessels that have gone above 36,000 miles in a year?

I think not, except the Medea.

At the rate you calculate, you average 240 miles in the twenty-four hours?

Yes. If the boats were wood, they would do that: if the boats were iron, I say they would give 12 miles an hour. The Great Western has averaged above 10 miles an hour; and she draws considerably more water, than the next boat they build for the same purpose, will draw. The great secret of giving a Steam-boat speed, is to let her go on the water, and not under it. I asked Sir John Rennie two days ago upon this very point, and he said yes, decidedly. I have asked Mr. William Morgan; I have asked Mr. Samuel Hall; and I have no doubt that Mr. Joshua Field will say the same thing. Before I propounded this plan, I waited the launch and the experiment of the Great Western; and the moment I saw that her capabilities even exceeded my anticipations, I then made my calculation upon vessels of 1,500 tons. I feel clear that the more you sift that particular question by the evidence of the most eminent engineers and practical men, the better you will be satisfied upon that point; there will be no difficulty. The delay pt. *J. Barber.*

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after each 3,000 miles, will average fifteen to twenty days; and that is time sufficient to do any repairs in the best possible manner.

Chairman.] How many vessels do you propose on this side of the Isthmus?

Two; and three on the other.

Mr. Larkins.] Do you think two are sufficient?

Quite so: they will only go 37,000 miles a year.

How would you do if one meets with an accident; as it appears that you would be fourteen days going out, and fourteen back again; consequently there are twenty-eight days, if you go regularly, every month?

In the event of accident happening, I should say, it will be much cheaper for the Company to charter a boat during the time of repairs for that accident, than to have a spare boat lying idle always: you can always charter a steam-boat for a time.

Mr. Auber.] Supposing an accident occurred between Suez and Calcutta, how would you charter a boat there?

There you have the duplicate machinery. But if any accident happened there, the two boats, during the repair of that boat, will keep up the communication between Calcutta and Suez, during the repair.

In the event of any accident happening to one of the boats between Suez and Calcutta, you consider that two boats would be ample to perform the service?

During the repair, unless it were something very fatal indeed; always remembering that there is a spare engine in Calcutta.

What station do you propose between Suez and Calcutta?

I have not made up my mind upon that point: it is to be a floating depôt; and you would have it during the south-west monsoon, upon the southern side, and in the north-east monsoon, probably upon the other.

You propose to have only one station between Suez and Galle.

One station between Suez and Galle.

Sir R. W. Horton.] You have said that such is the general disposition on the part of passengers, that if the quarantine were avoided, and if the vessel were to go straight from Alexandria to England; you believe that most of them would come by you. But are you not aware that there are a great number of persons who do not mind the time, and who have no great wish to get to their destinations rapidly?

Of a party of gentlemen, twenty in number, that lately came overland, one told me, the day before yesterday, they would all rather pay a larger sum of money, a great deal, overland again, than go round by the Cape of Good Hope.

Have you turned your attention to the fact, what number would be desirous of going to Germany, to Italy, or to Constantinople?

I have: but I have taken into consideration that there will be many others that will fill up their places. I consider that when we afford so great accommodation between Egypt and England, an amazing number of people will go to and from Egypt; and we shall have passengers from Egypt as well as from India.

You propose that the quarantine shall be partly effected during the passage, and partly by some depôt here: now, supposing you have a serious accident to your boat, have you considered what is to happen if you have not done your quarantine?

It resolves itself into this: supposing an accident happened to the boat, they would have then to perform the quarantine out of England. If they went into Gibraltar, they would be put upon quarantine there; and if they went to Malta, they would be put upon quarantine there. We cannot well provide against accidents of that description. When the quarantine was performed in England, they would be within reach of the Port, and of their friends, and their friends may go to them.

Mr. Auber]. How many days of quarantine are they obliged to perform?

That would depend upon circumstances; according to enquiries I have

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made, I should say that in those steam-boats it would vary from three days to twelve or fifteen days; the average may be taken at seven days.

Then calculating the passage at forty-three days, you would say fifty days between Calcutta and England?

Yes. I wish to observe the estimate of the outlay for five boats of 1500 tons, 250,000*l.*, is made in reference to Iron Boats; but if you would have wooden boats, the wooden boats will cost 62,000*l.* each; being an excess of 12,000*l.* over the iron.

Mr. Larkins. Are the Committee to understand that the communication is not to be kept up with boats of less tonnage, and less power than 1500 tons?

No, I do not say any such thing; I only recommended those. I will give in a calculation at next meeting of the Committee, of a boat 1000 tons, a boat of 1500 tons, and a boat of 1500 tons; their cost; their annual expense; and their comparative services.

Mr. Auber.] What is the diameter of the cylinder and the length of the stroke of the engines you propose?

The engineer will state that.

Chairman.] You have stated that you propose to have five boats of 1500 tons, which are to effect the passage between England and Alexandria, and between Suez and Calcutta. You have also stated that you require two boats for the Bombay branch. What size do you propose that those boats should be?

Those boats should be of 600 tons burthen, 200 horse-power.

What passage would those boats take?

Those boats would come down to Galle, and the January boat that came down to Galle, leaving Bombay on January the 6th, would reach Galle January the 11th.

How would she do in the monsoon?

She would do it the same.

The Semiramis is 800 tons?

Yes.

You are aware that she has been found insufficient to cope with the monsoon.

Yes.

Would there be any difference between the moonsoon she has had to encounter and the monsoon she would have to encounter if she went round to Galle?

Decidedly; she would go to Galle easily, but I mean to say that a 1500 ton boat would go direct in the wind's eye, and at any time from Bombay to the Red Sea, but I do not think it would be advantageous to employ them, because there is no influx of passengers that would pay for it; nor do I think it would be profitable; for though she would accomplish the passage, the wear and tear would be immense.

Mr. Auber.] Supposing that passengers came by your 600 ton vessel from Bombay to Galle, and are then embarked on board the 1500 ton vessel to go to the Red Sea, does the 1500 ton vessel in that course meet with the monsoons at all?

Very trifling. If I navigated that boat I should take one of the channels through the Maldives.

Would that increase the distance?

It would increase the distance, and therefore I would increase the power, to encounter difficulties. I wish to have spare power that the boats may come with regularity.

You consider that a boat coming from Galle on the 11th of January, with Bombay passengers, would have to encounter no weather that would militate against the performance of the passage within the time you contemplate?

I think not.

At any season of the year?

I think not at any season of the year. The reason for having two branch

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boats at Bombay is this, that I am anxious to give the Bombay people every advantage consistent with profit, in carrying out this plan. There is a great intercourse between the Straits, Batavia, and Bombay, and by having two branch boats, the boat would leave Galle, having deposited her mail and passengers in the boat homeward bound; she would go down to the Straits as far as Batavia, with only the additional expense of fuel, and she would return from the Sraits of Batavia in time to take up the outward bound mail from England to Bombay.

How does she go to the Straits?

She goes to Penang by Acheen Head.

What is the distance by that route to Singapore and Batavia?

I have not put down the distance here, but the boat No. 1, would leave Bombay January the 6th, she would arrive at Galle January the 11th, leave Galle January the 12th, and would arrive at Batavia January 22d; and she would return from Batavia and arrive at Galle again January 26th; and the mail would not arrive at Galle from England till the 5th of February, so that she would be waiting for it; therefore that boat would bring up from Batavia and from the Straits and also from China, passengers, and thus bring revenue into the main stream.

Mr. Pelly.] If she came full from Calcutta they must remain at Galle till the next boat.

There must always be a certain number reserved, you give the Bombay people a considerable advantage by giving them an intercourse between China and Bombay.

Chairman.] The next item is boats for the Nile.

I have increased that estimate a little in the detail, but still I shall keep under the 400,000*l.* I give two tugs not to exceed four feet draft of water, 2000*l.*; four flats not to exceed four feet draft when loaded, 8000*l.*; seven omnibuses, 1400*l.*; twelve skeleton carriages, 1800*l.*

Then there is an outlay at stations Alexandria, Suez, Galle, &c. 10,000*l.*?

I think that will be quite sufficient.

Then in the annual charges you state, "Coals, 35 days' steaming, 47 tons per day, is per annum 39,480*l.*," that is for the five boats. Therefore the Bombay boats you put 6000, making a total of 4580 at 40*s.* per ton, making in money 90,960*l.* Now how do you calculate the quantity of coals per day?

With the permission of the Committee, I will put in this detail of the coals. In making the estimate of coals, I have taken the consumption of 7lbs. for horse power, and I have considered the time that the engine will be relieved by favourable winds as equivelant to wastage. From London to Alexandria, 13 days' steaming, 7lbs. per horse power, is 45 tons per diem, multiplied by 12 is 7020 tons, to be placed in Alexandria; 7020 tons from England, I put at 14*s.* per ton. From Alexandria to London I have put the same quantity at 34*s.* per ton. Referring to page 94 of the Parliamentary evidence, and question 1155, it will be found that a party would engage to contract for any quantity at Alexandria at 34*s.* per ton. From Calcutta to Suez I take sixteen days, 7lbs. per horse-power, which comes to 8640 tons, to be put down at Calcutta, I have calculated them at 40*s.* per ton.

Is that for British coal?

British coal. From Suez to Calcutta we require the same quantity, 8640 tons; and I have estimated them at 64*s.* per ton.

Mr Auber.] In short, you allow 7lbs. per horse-power, including wastage?

Yes; the engines will be relieved by favourable winds, and I take that as equivalent to wastage. If the Committee reduce the engines to 500 horse-power, there will be a saving of 12,000*l.* a-year in the estimate for coals.

Chairman.] Does not the evidence before the Committee of the House of Commons go to the average being 8lbs. not 7?

Yes; but since that evidence was given there is a great improvement in the boilers, and I have taken British coal; but if you take the Anthracite coal, (which is also British coal, and which is being burnt in America, which I shall recommend any company being formed to test,)—if the Anthracite

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coal is used instead of the Llanelly and Newcastle, that will save 40 per cent. upon the estimate. There is a Committee appointed by Her Majesty's Government who are trying various fuels, and making various experiments upon it; and I am convinced that before any company is brought into operation the expense of fuel will be reduced one-half.

Mr. *Larkins.*] The next item is the victualling.

Here are the details: The captain, chief mate, and surgeon to be provided for at the passengers' table. I do not think the captain should have the control of this department; I mean that the captain should take his seat at the passengers' table, and the chief mate also; but the best plan for victualling would be to select the best stewards going round the Cape of Good Hope now, and contract with them at 10*s.* a day per head to victual the passengers, and there are plenty that would be very glad to do it, and do it well. If they did not do it well the captain would report and they would be dismissed. The second mate, third mate, purser, and the first engineer should form a mess, and be allowed 5*s.* each a day, 365*l.*; the carpenter and gunner, three engineers and one blacksmith should form another mess, and be allowed 2*s.* 6*d.* each a day, 274*l.* 15*s.*; and 54 sailors at 1*s.* 3*d.* each a day, 1231*l.* 17*s.* 6*d.*; the total victualling, 1871*l.* 12*s.* 6*d.* Then for the Bombay boats: the captain, chief mate, and surgeon would be provided for in the same way; the second mate, clerk, and first engineer, at 5*s.* each per day, 274*l.* 15*s.*; carpenter, gunner, two engineers, one blacksmith, at 2*s.* 6*d.* each per day, 288*l.* 2*s.* 6*d.*; twenty-eight sailors, at 1*s.* 3*d.* each per day, 456*l.* 5*s.*, making 959*l.* 2*s.* 6*d.* Those together would form for the victualling of the year, 11,276*l.* 7*s.* 6*d.* for seven boats.

Do you propose to give to the captain of the Bombay steamer the same wages as to the captains of the other steamers?

Yes.

The next item is the wages. Will you state the details of the estimate for wages?

To the captain I should give 500*l.* a-year; the chief mate 130*l*; the second mate 80*l.*; the third mate 50*l.*; and the surgeon 50*l.* Some gentlemen may consider that a very low price for the services of a surgeon; but where there are fifty surgeons who now go for nothing, I do not see, if you get a good man, why you should unnecessarily pay more. The passengers would make him presents. The purser 80*l.*; the carpenter 75*l.*; the gunner and steward 75*l.*; the chief engineer 200*l.*; the second 80*l.*; the third 70*l.*; the fourth 60*l.* With regard to the wages of the engineers, I have the opinion of engineers to say, that that is sufficient to get working engineers; and you would spoil them, if you gave them more—one blacksmith 60*l.*; eight stokers 192*l.*; twenty sailors 2*l.* each per month, 480*l.*; twenty sailors at 1*l.* 15*s.* each per month, 420*l.*; and six boys at 1*l.* each per month, 72*l.*; making a total of 2,674*l.*; which, multiplied by five, gives 13,370*l.* The Bombay boats would be reduced: the third mate 50*l.*; the engineer 60*l.*; four stokers 96*l.*; twenty sailors 420*l.*, making a difference of 626*l.*; annual cost 2,048*l.*; which, multiplied by two, gives 4,096*l.* Therefore, the gross sums for the wages are 17,466*l.* for the seven ships.

Mr. *Auber.*] Do you propose to take any cargo?

Yes. I only calculate for 150 tons at the commencement; although the capacity of the boats would be sufficient for more than that.

How long would it take to put in the coals at the station?

If a jetty projected from the ship be carried into effect, such as I will show here in detail, I will put the coals that I want in, in an hour and a half or two hours.

What quantity of coals do you conceive you should want?

Five days' consumption; that is 200 tons.

What expence do you consider the depôts would be?

12,000*l.* There is only one depôt; the others will be stations.

What is the expence of the stations?

I have calculated 5,000*l.* for the different stations.

You must have stations in England, at Alexandria, at Suez, Bombay and

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Point de Galle, and Calcutta. What expence do you allow for the severa stations?

I think 1,000*l.* a-year would be sufficient at Alexandria; I will not say as to England. In England it might be adviseable to have your own warehouse.

Mr. *Larkins.*] How is the management of those different stations to be conducted at the different parts where you have no agent on the spot?

You must have some person there; and there is 1,000*l.* allowed at each station for that.

That is to include the management of the different stations at Alexandria and the Red Sea?

Alexandria and Suez, Point de Galle, Calcutta, and Bombay.

Mr. *Small.*] Would you propose that promotion should go on in each ship respectively, not as embracing the whole of the five ships, but that in any ship in which a vacancy takes place, promotion shall take place in that vessel?

I think not; I think it should be considered a service of itself, and that when a vacancy for Captain takes place, the senior Chief Mate should be promoted to the command.

Mr. *Auber.*] The 10,000*l.* includes all charges in England?

Yes.

And 5000*l.* includes all charges abroad?

Yes.

Mr. *Larkins.*] Is there to be any resident agent at the different stations who would have the management of those boats when in port?

I consider that if a Company was formed here for carrying out this operation, you would appoint a superintendent to be out there, and I should think it would also require three directors at Calcutta?

No provision has been made for this in your estimate?

I think 10,000*l.* a-year, which is put down for management and officers, would be sufficient.

Mr. *Larkins.*] Do you mean the 10,000*l.* allowed for the management in England to include all the Company's agents abroad?

No, I do not; there is 5000*l.* for management abroad.

Do you think the 5000*l.* is enough to pay a party in Bombay, and a party in Calcutta, to manage the affairs of the Company?

I suppose there will be an agent appointed at the different Presidencies.

Mr. *Auber.*] This plan is quite free from any expectation of aid either from the Government or the East India Company?

It is; and I have put it to shew that it will yield a profit without any aid from either the Government or the East India Company; but I consider that if this plan is carried into effect, the East India Company and the Government must fall in with it.

With regard to the Egyptian part of the passage from Suez to Alexandria, what will be the cost of that?

I will put in a detail of that.

Mr. *Larkins.*] The Committee understand that there is no specific charge in your estimate for the management abroad?

There is 5000*l.* Anything that may be required for the management abroad that is not stated there, I will throw upon the contingencies of 10,000*l.*

The next item is insurance at five per cent?

To satisfy myself upon that point, I have made inquiries, and I find that I can do it at the offices at six per cent., and I can always insure at Lloyd's at 10*s.* per cent. under. I have no doubt that I can take it to Lloyd's and do it at five per cent.

The next item is the wear and tear and sinking fund 15 per cent. 50,250*l.*

That estimate is enough for wooden vessels; if it were iron, 7½ would do.

You have no doubt that the sum of 50,250*l.* would cover the wear and tear, and provide a sinking fund at the same time?

I have no doubt of it.

Mr. *Auber.*] You calculate 100 passengers from Galle to Suez?

I take 100 passengers in each boat, that is only taking one-half that annually go to and from India.

(Adjourned.)

Friday, 2nd November, 1838.

PRESENT.

Mr. Read.	Mr. Alderman Pirie.
Major Oliphant.	Mr. Gouger.
Captain Nairne.	Mr. Auber.
Mr. Small.	Major Turner.
Mr. Stewart.	Mr. Bagshaw.

T. A. CURTIS, Esq., in the Chair.

Captain *Barber* delivered in the following estimates and details:

(For which see following pages.)

CAPTAIN BARBER'S ESTIMATE FOR A COMPREHENSIVE PLAN.

OUTLAY.

Boats .	4 Boats of 1500 tons burthen and 600 horse power, built of the best material and fitted complete, each £62,000	£248,000	
	1 Ditto of Iron, ditto	50,000	
	2 Ditto of 600 tons burthen and 200 horse power, for the Bombay Branch	50,000	
Egypt .	Outlay in Egypt, see Details A	27,634	
India .	Floating depôt between Suez and Point de Galle .	12,000	
	Outlay at Bombay for coal shed . . .	1,000	
	Ditto at Galle	1,000	
	Ditto at Calcutta	1,000	
			£390,634

ANNUAL CHARGES.

Coals .	See Details B	£90,960	
Wages .	5 Large Steamers, 2 Bombay Branch Steamers, Nile and Canal Boats, see Details C	21,859	
	Floating depôt, see Details D	2,000	
Victualling	5 Large steamers, 2 Bombay branch, see Details E .	10,592	
Egypt .	Contract for Horses, see Details F . . .	15,695	
	Foreign management, see Details G . . .	4,980	
	Home management	10,000	
	Insurance 6 per cent.	23,438	
	Wear and tear and sinking fund, 15 per cent. .	58,595	
	Contingencies	11,127	
			£249,246

INCOME.

Passengers	Calcutta 50, at £130, less victualling . . .		£130,200	
	Madras 30, at £110		64,800	
	Bombay 20, at £110		42,720	
			237,720	
	Less 1 per cent. for collecting and remitting . .		2,374	
			£235,346	
Freight .	150 tons, including parcels, passengers, baggage, periodicals, valuables, &c., &c., at £10 .	£36,000		
	Less 5 per cent. commision, collecting, &c. .	1,800	34,200	
	Intermediate passengers and freight . . .		30,000	
			299,546	
	Annual charge .		249,546	
	Profit .			£50,000

DETAILS.

A.

OUTLAY in Egypt: Boats on the Canal:

1 Steam Boat, 35 tons, 20 horse-power		£2,500
2 Cargo Flats		4,000
1 Crane, at Alexandria		100
2 Ditto, at the Nile end of Canal		200
1 Truck, and 100 yards Iron Railway		150
		6,950
Nile to Cairo:		
1 Steam Boats, 50 tons, 30 horse-power	£8,000	
2 Cargo Flats	4,000	
1 Crane, at Cairo	100	12,100
Cairo to Suez:		
7 Omnibusses	£1,400	
10 Skeleton Carriages, each to carry 15 tons, admeasurement, say 3 wt.	1,500	
1 Crane, at Suez	100	3,000
Harness:		
56 Sets for Omnibusses, at £4	£224	
120 Do. for Vans, at £3	360	584
Outlay for Coal-shed at Alexandria		1,000
Ditto - ditto - at Cairo		1,000
Ditto - ditto - at Suez		1,000
Buildings and accommodation on the Desert		2,000
		£27,634

B.

London to Alexandria, 13 days steaming, 7 lbs. H. P. 45 tons per diem × 12 = 7,020 tons, at 14/		£ 4,914
Alexandria to London, 13 days steaming 7 lbs. H.P. 45 tons, at 34/		11,934
Calcutta to Suez, 16 days ,, ,,	8,640 at 40/	17,280
*Suez to Calcutta, 16 days ,, ,,	8,640 at 64/	27,648
Five days supply from the depôt each way between Calcutta and Suez	42 × 24·5·400 at 40/	10,800
Bombay and Galle	6·000 at 40/	12,000
	42·720	84,576
Balance		6,384
		£90,960

* Evidence before a Committee of the House of Commons, 1834, Question 1304.

Coals can be supplied by contract at Alexandria	34/ per ton	London Falmouth	To be delivered alongside by contract.
Conveyance to Cairo	6/ ,,	Alexandria Suez. Galle Bombay Calcutta	£6,384 to meet labour and other expences.
Cairo to Suez	12/6 ,,		
At Suez	52/6 ,,		

E.

VICTUALLING:

Captain, Chief Mate, and Surgeon, to be provided for at the Passengers' Table.

2nd Mate 3rd Ditto Clerk 1 Engineer	5/ per diem, 365 days	at 1*l*.	£365 0 0		
Carpenter Gunner 3 Engineers 1 Blacksmith	2/6 ,, ,,	at 15/	274 15 0		
48 Sailors	1/3 ,, ,,	at 3*l*.	1,095 0 0		
			£1,734 15 0	× 5 =	8,673 15

Bombay Boats:

2 Mates Clerk Engineer	5/ ,, ,,	at 15/	274 15 0		
Carpenter Gunner 2 Engineers 1 Blacksmith	2/6 ,, ,,	at 12/6	228 8 6		
28 Sailors	1/3 ,, ,,	1*l*. 15*s*.	456 5 0		
			959 2 6	× 2 =	1,918 5
					£10,592 0

C.

WAGES:

Large Boats:	Captain		£500
	1st Mate		130
	2nd Mate		80
	3rd Mate		50
	Surgeon		50
	Purser		100
	Carpenter		75
	Gunner and Steward		75
	Chief Engineer		200
	2nd ditto		150
	3rd ditto		100
	4th ditto		60
	1 Blacksmith		72
	12 Stokers, at £3 per Month		432
	20 Sailors, at £2 ,,		480
	10 Ditto, at £1. 15*s*. ,,		240
	6 Boys, at £1 ,,		72
			£2,866 × 5 = £14,33
Bombay Boats will be reduced—			
	3rd Mate	50	
	1 Engineer	100	
	4 Stokers	144	
	15 Sailors	360	654
			£2,212 × 2 = 4,42
Canal Steamers:	Master	£60 0	
	Mate	36 0	
	Engineer	100 0	
	2 European Sailors, £2 per month	48 0	
	2 Stokers, 1/ per day	36 10	
	2 Men, 30/ per Month	36 0	
	Victualling, 5, at 2/ per day	182 10	
			49
	Two Canal Flats, 2 Men, each 30/ per month × 4 =		14
Nile Steamers:	Master	£100	
	Mate	60	
	Engineer	100	
	2nd ditto	60	
	4 Stokers, £1	48	
	2 Europeans, £2	48	
	Victualling 6, at 2/ per day	219	
		£635 × 2 =	1,27
	2 Cargo Flats, 4 Men, each at £2 per month		19
	Manual Labour, Loading and Unloading, and removing the Cargo		1,00
			£21,85

D.

FLOATING DEPOT:

Master	£200	
1st Mate	48	
2 Ditto	36	
1 Blacksmith	60	
1 Blacksmith's Mate	36	
20 Men, at £2	480	
Victualling 3, at 5/ per day 22, at 1/3 ,,	866	
	1,726	
Sundry Stores	274	
		£2,000

F.

Having provided all the Carriages so essential to comfort, and gear appe taining thereto, I propose to contract for Horses across the Desert thus:—

7 Omnibusses, 8 Horses each	56
10 Vans, 12 Horses each	120
	176
Piastres per day	25
Piastres	4,300
Sterling	£43 × 365 = £15,695

G.

SUNDRY CHARGES at the different Stations for Management Abroad:—

1 Superintendent in Egypt	£600	
Assistant at Alexandria	300	
,, at Cairo	300	
,, at Suez	300	
Superintendent in India	1,500	
Assistant at Galle, 400 Rupees per month	480	
,, at Madras, 250 - ditto	300	
,, at Calcutta, 600 - ditto	720	
,, at Bombay, 400 - ditto	480	
		£4,980

COMPARATIVE ESTIMATE of THREE TIMBER STEAM SHIPS, one of 1,500 Tons, one of 1,250 Tons, and one of 1,000 Tons burthen; each to carry Eighteen Days' Fuel, at 7lbs. per Horse-power per Hour.

	15,000 TONS.		1,250 TONS.		1,000 TONS.
	£		£		£
Builder's charge, £16 10s. per ton	24,750		20,825		16,900
Copper - - - - - -	1,500		1,250		1,000
Engine of 500 Horse-power -	25,000	350 horse-power	17,500	300 horse-power	15,000
Cabin Furniture and Fittings -	4,000		4,000		3,500
Masts, Sails, Boats, Anchors, Gear, &c. &c., £4 per ton -	6,000		5,000		4,000
	£61,250		£48,575		£40,400

ANNUAL EXPENSE OF EACH BOAT ON THIS SIDE OF EGYPT.

	1,500 TONS.			1,250 TONS.		1,000 TONS.	
COALS.—*See* Detail (C.)							
Total cost of Coals on this side of Egypt for Two Boats,	£	s.		£	s.	£	s.
	£14,040÷2=7,020	0		£9,828÷2=4,914	0	£8,424÷2=4,212	0
WAGES.—*See* Detail (A) -	2,866	0		2,866	0	2,454	0
VICTUALLING.—*See* Detail (B)	1,734	15		1,734	15	1,424	4
Small Stores - - -	1,000	0		1,000	0	750	0
Insurance, 6 per Cent. -	3,675	0		2,914	10	2,424	0
Wear and Tear, 15 per Cent	9,187	10		7,286	5	6,060	0
Annual Expense of each Boat,	£25,483	5		£20,715	10	£17,324	4
Deduct Coals -	7,020	0		4,914	0	4,212	0
Annual Expense of each Boat, free of Coal -	£18,463	5	0	£15,801	10	£13,112	4
Total Cost of Coals on the Eastern side of Egypt for 3 Boats,	£46,460÷3=15,486	13	4	£32,508÷3=10,836	0	£27,864÷3=9,288	0
Annual Expense of each Boat on the Indian side	£35,929	18	4	£26,637	10	£22,400	4

DETAILS.

A. WAGES.

For the 1,500 Ton and the 1,250 Ton Steamers.

	£
Captain - - -	500
First Mate - - -	130
Second ditto - - -	80
Third Ditto - - -	50
Surgeon - - -	50
Purser - - - -	100
Carpenter - - -	75
Gunner and Steward - -	75
Chief Engineer - - -	200
Second ditto - - -	150
Third ditto - - -	100
Fourth ditto - - -	60
One Blacksmith - -	72
Twelve Stokers at £3 per Month	430
Twenty Sailors „ 2 „	480
Ten ditto „ 1 15*s*. „	240
Six Boys „ 1 „	72
	£2,866 0

The 1,000 ton Boat would be reduced

Ten Sailors, at £2 per Month -	240
One Engineer - -	100
Two Stokers, at £3 per month -	42
	412 0
	£2,454 0

B. VICTUALLING.

Captain, Chief Mate, and Surgeon, to be provided for at the Passengers' Table.

		£	s.	d.
2nd Mate 3rd Mate Clerk 1st Engineer	5*s*. per diem— 365 days, at 1*l*.	365	0	0
Carpenter Gunner 3 Engineers 1 Blacksmith	2*s*.6*d*. per diem 365 days at 15*s*.	274	15	0
48 Sailors, at 1*s*. 3*d*. per diem, 365 days, at 3*l*. - -		1,095	0	0
		1,734	15	0

The 1,000 ton Boat would be

	£	s.	d.
reduced 10 Sailors, at 1*s*. 3*d*. per diem, 365 days at 12*s*. 6*d*.	219	6	0
2 Stokers, at 1*s*. 3*d*. per diem, 365 days, at 2*s*. 6*d*. - -	45	12	6
1 Engineer at 2*s*. 6*d*. per diem, 365 days, at 2*s*. 6*d*. -	45	12	6
	310	11	0
	£1,424	4	0

COAL DETAIL. C.

1,500-Ton Boat.

London to Alexandria, 13 days' steaming × 12 = 156 at 37 tons 10 cwt. per diem 156 × 37 10 = 5,850 tons, at 14/	£4,095	
Alexandria to London „ at 34/	9,945	
		£14,040
Calcutta to Suez, 16 days' steaming × 12 = 192 at 37 tons 10 cwt. per diem 192 × 37 10 = 7,209 tons, at 40/	£14,400	
Suez to Calcutta „ at 64/	23,040	
Five days' supply from Depôt 5 × 24 = 120 at 37 tns 10 ct. pr dm 123 × 37 10 – 4,500 tons, at 40/	9,000	
Cost on the Eastern side -		46,440
Total cost -		£60,480

1,200-Ton Boat.

Ditto - - ditto - - - - at 26 tons 5 cwt. per diem 156 × 26 5 = 4,095 tons, at 14/	2,866 10	
Ditto - ditto - at 34/	6,961 10	
		£9,828
Ditto - - ditto - - - at 26 tons 5 cwt. per diem 192 × 26 15 = 5,040 tons, at 40/	£10,080	
Ditto - ditto - at 64/	16,128	
Ditto - - ditto - - - at 26 tons 5 cwt. per diem 120 × 26 5 = 3,150 tons, at 40/	6,300	
- - - - -		32,508
- - - - -		£42,336

1,000-Ton Boat.

Ditto - - - ditto at 22 tons 10 cwt. per diem 156 × 22 10 = 3,510 tons, at 14/	£2,457	
Ditto - ditto - at 34/	5,967	
		£8,424
Ditto - - - ditto at 22 tons 10 cwt. per diem 192 × 22 10 = 4,320 tons, at 40/	£8,640	
Ditto - ditto - at 64/	13,824	
Ditto - - - ditto at 22 tons 10 cwt. per diem 130 × 22 10 = 2,700 tons, at 40/	5,400	
- - - - -		27,864
- - - - -		£36,288

FIVE BOATS.

OUTLAY.

Five Boats, of 1,500 tons each, £61,250 × 5 = £306,250.
Five Boats, of 1,250 tons each, £48,575 × 5 = £242,875.
Five Boats, of 1,000 tons each, £40,400 × 5 = £202,000.

ANNUAL EXPENSE.

Whatever may be the size of the Boats, the same disbursements would be entailed at the Stations, &c. being so much in favour of large Boats.

	£	s.	d.		£	s.	d.	£	s.	d.
Three Boats, 1,500 tons each,	33,929	18	4	× 3 =	101,789	15	0			
Two Boats, 1,500 tons each,	25,483	5	0	× 2 =	50,966	10	0			
								152,756	5	0
Three Boats, 1,250 tons each,	26,637	10	0	× 3 =	79,912	10	0			
Two Boats, 1,250 tons each,	20,715	10	0	× 2 =	41,431	0	0			
								121,343	10	0
Three Boats, 1,000 tons each,	22,400	4	0	× 3 =	67,200	12	0			
Two Boats 1,000 tons each,	17,324	4	0	× 2 =	34,648	8	0			
								101,849	0	0

EARNINGS.

Boats.				£	£	£
1,500 Tons.—Upper Deck, 17 Double Cabins						
Lower Deck, 4 „ „	86 Passengers, each	120 =		10,320	× 24 =	247,680
„ 44 Single „						
1,250 Tons.—Upper Deck, 13 Double „						
Lower Deck, 2 „ „	70 „ „	120 =		8,400	× 24 =	201,600
„ 40 Single „						
1,000 Tons.—Upper Deck, 11 Double „						
Lower Deck, 6 „ „	64 „ „	120 =		7,680	× 24 =	184,320
„ 30 Single „						

DIFFERENCE OF ACCOMMODATION.

BOATS.	TONNAGE.	PASSENGERS.	CHARGE.			EARNINGS.			DIFFERENCE OF AMOUNTS.		
			£	s.	d.	£	s.	d.	£	s.	d.
5	1,500	2,064	152,756	5	0	247,680	0	0	94,923	15	0
5	1,250	1,684	121,343	10	0	201,600	0	0	80,256	10	0
5	1,000	1,536	101,849	0	0	184,320	0	0	82,471	0	0

DIFFERENCE OF SPEED.

1,000 Ton Boat—34 Days' steaming loses upon 1,250,204 Miles × 24 = 4,896—or 20 Days' consumption of Fuel and Provision for Passengers.
„ „ „ „ 1,500,612 „ × 24 = 14,688—or 60 „ „ „ „
1,250 „ „ „ 1,500,408 „ × 24 = 9,792—or 40 „ „ „ „

CONSEQUENT DIFFERENCE OF COST.

	£		£	£
1,000 Tons against 1,250—20 Days' consumption of Fuel - - -	960	—To Provision of Passengers - - -	640 =	1,540
„ „ 1,500—60 „ „ „ - - -	2,700	„ „ - - -	1,920 =	4,620
1,250 „ 1,500—40 „ „ „ - - -	2,080	„ „ - - -	1,400 =	4,400

CAPACITY FOR CARGO, STORES, AND PROVISIONS.

1,500 Tons	29,600	Cubic Feet or Tons	740	Weight	376 Tons.
1,250 „	23,600	„ „	500	„	444 „
1,000 „	20,400	„ „	510	„	340 „

Iron Boats of the same tonnage would have, upon an average, Two Feet more Beam,—the Cabins would be consequently larger, and very considerable more space for Goods.

DIMENSIONS AND CAPACITY OF BOATS.

Number of Tons.	Length.		Breadth.		Depth.		Horses' Power.	Draught of Water.		Length of Engine Room.	Area of Midship Section.	Speed.		Weight of Hull.	Weight of Engines.	Weight of Stores.	Weight of Cargo.	18 Days' Coals.	Displacement.	Displacement per Inch.	
	Feet.	In.	Feet.	Inches.	Feet.	Inches.	Number.	Feet.	Inches.	Feet.	Feet.	Miles.		Tons.	Tons.	Tons.	Tons.	Tons.	Tons.	Tons.	
1,000	196	0	32	8	21	0	300	15	6	63	437	10	5	570	300	140	236	404	1,800	12	5
1,250	212	0	35	6	22	0	350	16	0	78	489	10	7	730	350	170	274	472	2,080	14	0
1,500	225	0	37	6	22	0	500	16	6	80	539	11	3	870	500	190	150	664	2,330	16	0
750	172	6	30	4	20	0	250	13	6	62	361	10	3	400	250	110	90	360	1,216	10	8
*1,341	212	0	36	0	23	0	450	17	0	91	620	11	0	776	450	190	540	600	2,461	15	4
†1,800	237	0	40	0	19	0	500	16	0	84	555	11¼	0	1,100	500	200	200	700	2,720	18	0

* "Great Western."   † "British Queen."

BOATS from FALMOUTH to EGYPT, would ply as follows:—

	STARTS FROM		ARRIVES AT	
BOAT No. 1.	Falmouth	Jan. 5	Alexandria	Jan. 19
	Alexandria	Feb. 5	Falmouth	Feb. 19
2.	Falmouth	Feb. 5	Alexandria	Feb. 19
	Alexandria	Mar. 7	Falmouth	Mar. 21
1.	Falmouth	Mar. 5	Alexandria	Mar. 19
	Alexandria	April 5	Falmouth	April 19
2.	Falmouth	April 5	Alexandria	April 19
	Alexandria	May 5	Falmouth	May 19
1.	Falmouth	May 5	Alexandria	May 19
	Alexandria	June 5	Falmouth	June 19
2.	Falmouth	June 5	Alexandria	June 19
	Alexandria	July 5	Falmouth	July 19
1.	Falmouth	July 5	Alexandria	July 19
	Alexandria	Aug. 5	Falmouth	Aug. 19
2	Falmouth	Aug. 5	Alexandria	Aug. 19
	Alexandria	Sept. 5	Falmouth	Sept. 19
1.	Falmouth	Sept. 5	Alexandria	Sept. 19
	Alexandria	Oct. 5	Falmouth	Oct. 19
2.	Falmouth	Oct. 5	Alexandria	Oct. 19
	Alexandria	Nov. 5	Falmouth	Nov. 19
1.	Falmouth	Nov. 5	Alexandria	Nov. 19
	Alexandria	Dec. 5	Falmouth	Dec. 19
2.	Falmouth	Dec. 5	Alexandria	Dec. 19

BOATS from CALCUTTA to SUEZ, would ply as follows:—

	STARTS FROM		ARRIVES AT	
BOAT No. 1.	Suez	Jan. 24	Calcutta	Feb. 18
2.	Calcutta	Jan. 5	Suez	Jan. 30
	Suez	Feb. 24	Calcutta	Mar. 21
3.	Calcutta	Feb. 5	Suez	Mar. 2
	Suez	Mar. 27	Calcutta	April 21
1.	Calcutta	Mar. 5	Suez	Mar. 30
	Suez	April 24	Calcutta	May 19
2.	Calcutta	April 5	Suez	April 30
	Suez	May 25	Calcutta	June 19
3.	Calcutta	May 5	Suez	May 30
	Suez	June 24	Calcutta	July 19
1.	Calcutta	June 5	Suez	June 30
	Suez	July 25	Calcutta	Aug. 19
2.	Calcutta	July 5	Suez	July 30
	Suez	Aug. 24	Calcutta	Sept. 18
3.	Calcutta	Aug. 5	Suez	Aug. 30
	Suez	Sept. 24	Calcutta	Oct. 19
1.	Calcutta	Sept. 5	Suez	Sept. 30
	Suez	Oct. 25	Calcutta	Nov. 19
2.	Calcutta	Oct. 5	Suez	Oct. 30
	Suez	Nov. 24	Calcutta	Dec. 19
3.	Calcutta	Nov. 5	Suez	Nov. 30
	Suez	Dec 25	Calcutta	Jan. 19
1.	Calcutta	Dec. 5	Suez	Dec. 30

BOMBAY BOAT.

BOAT No. 1.	Bombay	Jan. 6	Galle	Jan. 11
	Galle	Jan. 12	Batavia	Jan. 22
	Batavia	Jan. 26	Galle	Feb. 8
	Galle	Feb. 10	Bombay	Feb. 16
2.	Bombay	Feb. 6	Galle	Feb. 11
	Galle	Feb. 12	Batavia	Feb. 22
	Batavia	Feb. 26	Galle	Mar. 8
	Galle	Mar. 10	Bombay	Mar. 16

Capt. *J. Barbe*

2 *November* 18

Chairman, to Captain *Barber*.] You state in your estimate that the passengers to Calcutta will be fifty, at 130*l.* each, less victualling 130,200*l.* How do you calculate the victualling?

At 10*s.* per day.

Is 130*l.* the usual sum paid for going to Calcutta by passengers by the East India ships?

Some pay 200*l.*, some 250*l.*, some 100*l.*, some 80*l.*, but I have taken the average at 130*l.*, and I think in a steam-ship at starting no man ought to be allowed to go under 100*l.* Eventually I can conceive the time may arrive when it will be reduced to 80*l.* at the highest charge. I think that when boats go once a fortnight to India, they will be taken at 80*l.* a head.

Mr. *Small*.] Do you intend to take steerage passengers?

Decidedly.

At what rate do you intend to take them?

I have not calculated them at all; and that will make the income larger.

Chairman.] How do you get the number of passengers?

To some gentlemen, the number of passengers may appear to be larger than ought to be estimated—I think not. These are my reasons. They exceed but little one half the number that now travel to and from India. Before a Parliamentary Committee, Mr. T. Love Peacock stated in evidence "he thought people would go if they had no reason for going, when they had a good opportunity of travelling provided;" and that "1000 might be calculated upon each way; that nobody who could afford to go by steamers, would go by sailing vessels." On being again asked Question 775, viz.: "Do you think that a consequence of this regular, speedy, and convenient communication will be the resort of a great number of Europeans to India?" "Yes, I do certainly; and I think the motive of passing through countries that are interesting from their antiquities, would be a motive for people to go in that line." "But you think a greater number of Europeans will go to India in consequence?" "Yes, I think so," Before the same Committee, the same opinion is expressed by Lord William Bentinck, by Sir Alexander Johnstone, by Mountstuart Elphinstone, Esq., Mr. Turton, and others. There are also many officers, civil and military, who now go to the Cape on sick leave; and they retain a portion of their allowances while there. I think it fair to assume that when this undertaking becomes completed, they would visit Egypt; for the same privilege extends to that country; and their friends might go to Egypt to meet them. Captain Mackenzie stated in evidence, that he met several travellers in Egypt who would have gone on to India, had this proposed facility of transit been established. Then again, Lord William Bentinck, and the gentlemen I have before quoted, all state, if this communication were established, many of the native gentlemen of India would come to England. This is also the opinion of the most talented and enlightened nobleman from the East, who has ever visited this country, (except the ill-fated Rammohun Roy) I mean the Prince of Oude; with whom I am in constant personal communication. It is a subject of considerable interest to him; and one to which he often reverts. This is also another reason why the ships should be larger, that a portion of the accommodation might be fitted to suit their tastes and prejudices. They would be most profitable passengers; for they would pay the whole sum, and find themselves in provision. There would be passengers from the Straits, China, Batavia, Isle of France, and the whole continent of Europe. With these considerations, I do not think I have overstated the number of passengers.

Does that answer apply to Calcutta, or to the whole of India?

To the whole of India.

Mr. *Auber*.] Have you any means of ascertaining what is the usual passage-money from India to England by the Cape?

This year I have paid passage-money to the amount of nearly 8000*l.*; and in paying that, I have paid from 250*l.* to 80*l.* and none less; it depends upon the accommodation; and I wish to explain here, that the steam-vessel should be fitted in the same way as the vessels by the Cape are. A gentle-

Capt. *J. Barber*.. man and his wife would take a better cabin than a single individual; and they would pay more.

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What is about the average with regard to a single individual going out?

I think if you get a ship, say with twenty-six passengers on board, that will make thirty-three or thirty-four hundred pounds, passage-money. The price which I have put down is not a mere calculation of my own; it is after considerable communication with the East India Officers, civil and military.

Does that sum include steerage passengers?

No; merely the best class passengers. There is this advantage in passengers going this way; that in going by the Red Sea, their outfit is much less, and therefore, they would pay a little more.

Chairman.] With respect to Madras, you say, 30 passengers to Madras: is 110*l.* considered to be the proper charge for passengers to Madras?

Yes.

Major *Oliphant.*] Has it occurred to you whether there is a necessity for the Bombay people joining you at Galle, instead of going across to Socotra?

Yes; because four months in the year, although it would be practicable to go across, it would not be profitable. The Bombay boat would be an unprofitable concern, take it any way that you will; it therefore becomes a calculation, which is the best way you can give the Bombay people the greatest advantage, with profit to the general concern. The boat leaving Bombay and coming to Galle, and going on to the Straits, and coming back from the Straits, and up the Malabar coast, will give the Bombay people the advantage of dropping passengers and parcels on the coast of Malabar; —it will give them an early communication with China; and there is a great intercourse between Bombay and the Straits; and it will bring traffic into the main stream.

Chairman.] Is there any advantage in the Bombay boat going to Galle, over its going to Socotra?

During four months of the year it would have to go by Galle under any circumstances.

Would it not be more advantageous to the Bombay people, if they could get a change of boat at Socotra?

I think it would; but not to this concern—and you are legislating here not for any particular locality, but for the general good.

Do not you think that if you gave that advantage to Bombay, it would have the effect of increasing the intercourse between Bombay and this country, and therefore give you a greater number of passengers?

No; I think the advantage would be confined to a few merchants at the Port of Bombay only. It matters very little to an officer in the army, or a civil servant, whether he receives his letter on the 17th or the 13th, as long as there is regularity and dispatch, and comfort for himself, when he comes away.

Would not all the purposes of the communication with the Straits be answered by the boat's going to Socotra, and there being forwarded by the mail to Bombay, carrying out his dispatch to Galle, and so getting in that line?

It would be more expensive. There are a great many passengers who would go from Calcutta and Madras by Steam-boat to Bombay, and would join the boat at Galle, and go up.

Would not they find the same convenience by going on from Galle to Socotra?

It would be more expensive. You would have to keep them so many more days.

With respect to fuel; would it not be better for you to leave your depôt of coals at Socotra or at Mocha?

It is to be so. It is to be about the mouth of the Red Sea.

Mr. *Read.*] You said that you considered that the Bombay boat would be a losing concern. Do you calculate, in the revenue of the Bombay boat, any return for carrying opium from Bombay to the Straits?

I do. That is one of the parts of the intermediate freight.

Chairman.] Opium in large packages?

In peculs weighing 133 pounds.

Then do you calculate that there will be any amount of heavy freight in respect to the transit and communication between Galle and Bombay?

Yes; I calculate that there will be produce from the Straits up to Bombay, and from Bombay to the Straits.

Which can be carried in those small boats?

Yes.

What accommodation will you have for passengers, if you have so large a stowage for goods?

Accommodation that will carry thirty passengers; the estimate is only twenty.

For a 600 ton vessel?

Yes. She would carry treasure up from the Straits. There is a great deal of gold goes from Singapore to Bombay. The last time I was at Singapore, they would have given anything for freight for treasure.

You say there is a great traffic between Batavia and the Straits and Bombay. Suppose it happened that your 600 ton vessel coming up from Batavia should have already thirty passengers, what is to become of the passengers that go across from Suez to Galle expecting to find accommodation to Bombay?

They would find a boat at Galle to take them.

Supposing the thirty cabins are filled already?

That must be a matter of agreement by whatever parties who take the detail of the Company inland. They will leave regulations that passages must be taken so many days before the vessel sails.

Suppose thirty berths are already taken from Batavia coming up to Galle?

There are only twenty put here, and that leaves ten for the Straits. It is only a five days' passage from Point de Galle up.

Mr. *Larkins.*] Do not you think that by embracing a communication with the Straits and Batavia, you would interfere with the direct communication between Suez and Bombay?

I think not; I think that with reference to the time mentioned in the paper I have given in, showing how the boats would meet, it will be seen that it would not. If there were a great many more passengers from Batavia and the Straits to Bombay, we should put on another boat, and make it very profitable indeed to the concern. I think it is probable that very soon we should be obliged to have an extra branch boat. There are ten days to spare, and the navigation from Batavia to Bombay and back is like a mill-pond; it is like the river Thames.

Major *Oliphant.*] You say that the boat is to continue through the Straits, calling at Penang, Malacca, and Singapore. Now, is your object chiefly passengers, merchandize, letters, or what?

All combined.

Do you conceive that any considerable quantity of merchandize would go by that route?

My experience tells me that from Bombay there would be a great deal of opium, and up from the Straits a great deal of treasure and other articles.

Mr. *Auber.*] You would be 14 days going from Galle to Batavia; what quantity of fuel do you require for that?

It is calculated in the Coal detail.

Chairman.] You consider that those 20 passengers to Bombay at 110*l.* each is the right number to take?

Yes; I think it is under the mark. I have endeavoured to make the outlay and the annual charge as large as I possibly can, and, according to my opinion, the income as small.

Mr. *Alderman Pirie.*] How do you calculate the commission of one per

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cent for collecting and remitting, as the East India agency houses charge you one per cent. for remitting alone?

If I was Chairman of a number of directors forming a company of this kind I would very soon find houses in Calcutta, Madras, and Bombay, that would be too happy to receive the money and remit it at one per cent. I believe that any agency house would be very glad to receive the passage money, or the Directors at Calcutta would be glad to receive the money and remit it at one per cent.

Mr. *Bagshaw.*] Do not you imagine that those gentlemen in India who are going to contribute 140,000*l.* to the furtherance of this undertaking, would claim to themselves the right of having a board of directors, in Calcutta and other ports?

In Calcutta only.

Do not you think the secretary they will appoint will manage those things without the loss of one per cent.?

He may at Calcutta. I have made this charge with the desire of making the income as small as I can, and if it is struck out, it will make the income so much the larger.

Chairman.] In looking over the charges, here is a superintendent in India, 1500*l.* a-year. Will he be at Calcutta?

No; he will be going about; he will be the superintendent-general. There will be an assistant at Calcutta besides, and one at Bombay.

Would not each of those assistants be persons who might receive the money?

I think not; but I can have no objection to striking out that item.

With respect to freight; you calculate on taking 150 tons on each voyage?

I do. That includes parcels, passengers' baggage, and periodicals. I have charged that 10*l.* a ton; some of those tons of goods will be paid for at the rate of 50*l.* At the present time a guinea is charged for one pound weight.

What do you calculate the freight will consist of?

The freight will consist of all the periodicals that go. There are four or five houses in London that send 140*l.* or 150*l.* worth every month, and would take, I should think, at an *ad valorem* rate, so much a magazine. I have paid for a great many parcels this year. A gentleman has a coat or books, or anything to send, he has paid a guinea, and I think he would be glad to give 30*s.* to send by this route; also light millinery goods and passengers' baggage and all perishable articles. I have no doubt that the very year that this is established every ham and cheese that goes to India will go by this route, considering the state in which they now arrive by the present route, and the perfection in which they would arrive then. Therefore seeing that many portions of the freight would be at the rate of 40*l.* or 50*l.* a ton, I do not think I have over-estimated it in taking the average at 10*l.* a ton.

Do you calculate upon any heavy goods going across?

I think not very heavy.

What kind of goods?

I do not see why quicksilver should not go, and cochineal and Turkey opium.

Mr. *Larkins.*] Do you intend to charge anything for the passengers' baggage?

There must be a limit to that certainly. I have known a passenger take three tons of baggage; some take a dozen tons. I should say that you would not allow above half a ton by this route.

What description of goods would pay less than 10*l.*?

Nothing would pay less than 10*l.*

Mr. *Stewart.*] Must not you have one charge for all descriptions of goods?

Certainly not; for periodicals, for example, I would have an *ad valorem* charge.

Supposing they are done up as parcels?

That is not my plan. A parcel might be done up and it might be pearls. I should take pearls at a per centage. A parcel might be done up consisting of a watch, but I should take it as a watch. I had an order from the officers of a regiment to present the adjutant who is retiring, a sword of £50 value, I should have been very glad to give 20*s.* to get it out to Bombay, but I was obliged to send it by sea, and I was obliged even in sending it by sea to pay a guinea.

Major *Turner.*] You would require everybody bringing any thing to state what it is?

Not with all things.

Do you think there would be no means of evading any such regulations?

I think not—it is done now by all steamers.

Mr. *Stewart.*] If a person packed up three or four periodicals in one parcel, how could you discover it?

It must be put to the honor of gentlemen. I would not wish to be absolute, but you must have certain regulations.

You would have a minimum charge, and you would take all parcels at that rate which did not exceed that size, and you calculate that at that minimum rate it would exceed 10*l.* a ton?

Certainly.

Mr. *Larkins.*] Will you explain what you mean by "intermediate passengers and freight?"

The item set down for intermediate passengers and freight, I estimate for passengers between this and Alexandria, and between Alexandria and this; passengers between the different presidencies in India, and passengers and freight between the same, and sick officers to Egypt.

How do you make up the sum of £30,000? Is not it a very large sum?

I think not. There will be quicksilver from Trieste, and opium from Turkey, which pays a very large freight.

Chairman.] You say that the whole number of passengers to India will be 100, and therefore, of course, if you have 100, you will have the boats pretty well filled. How would you accommodate the intermediate passengers?

The plan I should propose to adopt for intermediate passengers will be this. The passages for the whole line would be kept open to a certain date, and after that you take any passenger that comes, whether intermediate or not. If the boat is to sail on the 5th of January, I would say that up to the 25th of December the accommodation would be kept open for the Indian passengers, and after that intermediate ones, and they would be taken as they came up. When I produce the plans of the vessel, I believe I shall satisfy the Committee, that she shall have room for more passengers, independently of the 150 tons of freight and her fuel.

Mr. *Larkins.*] Do you think that by taking in freight at the intermediate places you would greatly delay the vessel in her passage?

I think not. You will see that there is an allowance made for stoppages, and a time allowed.

Chairman.] Between this and Alexandria would you stop anywhere?

Outward bound I think it would be profitable to drop passengers at Gibraltar or at Lisbon, but no goods.

You say there are to be five boats to do the whole service. At what rate do you apprehend those boats will be able to go against the south-west monsoon?

If the boat proceeds according to my plan from Galle, 8 to 10 knots an hour.

Against the monsoon?

They will not have to go against the monsoon.

At what rate do you calculate that the Bombay boats of 600 tons will be able to go against the monsoon?

She will not have to go against the monsoon, she would come down with a slant.

If you had to bring your boat either to Aden or Socotra or Mocha, you would have to face the south-west monsoon?

Yes; right in the wind's eye.

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You have proposed to have one iron boat of 1500 tons which is to cost £50,000. You were asked whether it was within your knowledge that any boat of such a tonnage had been built of iron, and you said you did not know of any one.

No, I do not. I wish to say that since I gave in my evidence at the last meeting, I have had a very long conversation with Mr. Joshua Field, who is a partner of Maudslay and Field; I have his authority for saying that my allowance of 7lb. of coal per horse power, is quite sufficient. I have his authority for saying that there can be no difficulty about a steam engine performing 40,000 miles a-year, and I have his authority for stating that an iron boat, properly constructed after the manner I have explained to him, of 1500 tons burthen, will be as superior as it is possible for one boat to be to another, over any wooden one that can be launched. With the permission of the Committee I wish to record the arrangement for the passage through Egypt.

> "Steam Ship No. 1, will arrive at Alexandria, January 19th, and immediately load the canal cargo flats.
>
> "Suppose this should occupy 8 hours, canal steamer tows them to the Nile in 8 hours, canal steamer returns to Alexandria to wait for passengers in 5, making 21 hours. Canal steamer will leave Alexandria 20th A. M. with 50 passengers, who having joined the Nile steamer No. 1, will proceed to Cairo immediately (with cargo flat No. 1, in tow) and will arrive there 21st P.M.
>
> "The canal steamer returned to Alexandria 20th to wait for the last division of passengers. The first five vans are loaded immediately the goods arrive at Cairo 21st P.M., and start for Suez, at which place they will arrive on 22nd.
>
> "The first fifty passengers sleep at Cairo, and start in omnibus 22nd A.M. They will arrive half way, and sleep a night, and start for Suez 23rd A.M., and get on board that evening.
>
> "The second fifty passengers will leave Alexandria 21st A.M., join the Nile boat No. 2, and take in tow cargo flat 2. They will arrive at Cairo 22nd P.M. The second vans will be dispatched immediately, and will arrive at Suez 23rd late at night.
>
> "The second fifty passengers will sleep at Cairo, and will leave Cairo 23rd A. M., sleep at the half-way house that night, and start A. M. 24th. All get on board that evening, and the ship will sail for India."

Are you certain that they will allow a steamer upon the canal?

It is in evidence that the Pacha intended to put a steamer upon the canal; if he did not put a steamer upon the canal, we should have to track the boats, which would be less expensive in the outlay, and it would make a few hours difference in the time, but still we should be in sufficient time.

You were understood to say that you intended to make a division, that the passengers would go by Canal, and the goods round the coast.

In consequence of some remarks made here the other day, I have made a great many inquiries with respect to the Bar of Rosetta. I have seen some shipmasters, and I find that there would be no difficulty in doing it, and that the Bar can be removed at a very trifling expence, and that it would be a much cheaper plan than this; therefore I prefer taking the largest outlay possible, giving the company the benefit of doing what I think will be hereafter arrived at; that is, that the large steamer would not go to Alexandria at all, but go to the Bay of Aboukir, and that she would immediately have the Nile boats beside her, and put her passengers into them.

How would that agree with the views of the Pacha?

That would be a matter for negociation between the Company and the Pacha.

Mr. *Read.*] Do you suppose that after the arrival at Alexandria it will occupy only 8 hours in transit, shipping the baggage and cargo?

The cargo would be in sectional cases. I would undertake to do it in four hours.

Major *Oliphant.*] If you undertake to transfer passengers the whole way, have you made any allowance for buildings of any sort at Suez?

The passengers would go on board at Suez. I have put down an item of an outlay of £2,000 upon the Desert, according to the report which I have of the

Bombay Committee. I think that would be ample; it is double what they have allowed. If there were £1,000 allowed for the purpose, I think that would be sufficient. I have made a large allowance for contingencies.

Chairman.] What would be the draft of water of wooden boats?

There would be a considerable difference between the wooden and the iron, but a wooden boat of that tonnage might be made to draw about 16 feet, the iron I think would draw about 14.

Mr. *Auber.*] In the details under letter B. you say, "London to Alexandria, 13 days steaming." Then 16 days from Calcutta to Suez, which makes 29 days. Then there is 3 days crossing the Desert from Suez to Alexandria, making 34 days altogether. How many days, at 10*s*. a-day, do you deduct from the whole time?

Forty-three days.

Chairman.] How do you propose to convey your coals across to Suez?

I should convey them up as far as Cairo by our own boats, and then across partly on our cargo trucks, and partly on camels.

Mr. *Bagshaw.*] Would it not be cheaper to carry the coals round by the Cape of Good Hope?

Decidedly not.

How would you get your coals to Ceylon?

By freight from London.

How do you propose to get them to the floating depôt?

By freight from London. Many ships go in ballast to Bombay.

Major *Oliphant.*] With regard to the number of passengers, have you taken into consideration that there will be fewer in the Monsoon months than you have put down here?

I have taken the passengers, assuming that we shall have one-half of all that go; these 1500 ton boats will take much more.

If you make allowance for 100, and that is the capability of the vessel, will not you have much less than that in the Monsoon months?

Then you will have more in the other months, and that shews the great importance of having a 1500 ton boat.

Major *Turner.*] Have you ever ascertained whether any competent and responsible persons would be willing to supply coal at Suez and those places by contract?

Yes, at 64*s*. a ton at Suez.

Mr. W. D. HOLMES was called in, and examined as follows:— Mr. *W. D. Holmes.*

Capt. *Barber.*] You are an engineer?

I am.

You have been regularly educated as an engineer?

I have.

Do you hold any public situation?

I hold a situation as Engineer to the Railway for the Midland Counties.

Have you turned your attention to Steam Navigation?

I have for many years.

Have you particularly turned your attention to the construction of an iron steam-boat?

I have, and particularly the last six months my attention has been almost exclusively devoted to the construction of iron steam-boats, and steam apparatus calculated for propelling it.

Will you inform the Committee what would be the cost of an iron steam-boat of 1500 tons burthen and 600 horse power?

My estimate is 50,000*l*., a liberal sum.

Will you inform the Committee what would be the draft of water of such a boat with 18 days' fuel on board fitted for the voyage?

She would require 810 tons; she would draw 12 feet 6 water.

What room would she have for cargo after having her 18 days' fuel on board?

780 tons.

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What would be her draft then?

17 feet, the immersion of the Great Western, which is only 1300 tons.

What would be the weight of the boat without her cargo?

With her engines 850 tons, without her engines 350 tons; but in this calculation I have allowed 150 tons for stores.

Supposing that vessel to be loaded to a medium draft of water of 15 feet, what would be her speed over an average of 3000 miles?

I should say, taking all weathers, her average speed would be from 10 to 11 miles an hour, including the Monsoons.

Do you think that the steam engine would be capable of performing over a distance of 40,000 miles a year with 3,000 mile stages, and a rest between from 17 to 23 days?

Very easily.

You have no doubt upon that question?

None whatever.

What would be the weight of a wooden boat of the same tonnage and power?

For a boat that I should build for a communication with India, and which, of course, should be strongly built, it would be 900 tons, and the engines might be stated the same, that is, 1400 tons.

She would weigh, with her engines, 1400 tons?

Yes.

How many feet of water do you consider a wooden boat, with 18 days' fuel on board, would draw?

16 feet 11 inches—say 16 feet.

What would be the diameter of the cylinder?

84 inches.

What would be the length of the stroke?

9 feet.

As it is an extraordinary power to put into a boat, will you state the reason why you would put such a power into a boat for Steam Navigation to India?

The reason I should put such an extraordinary power into her is to meet the difficulties in the Indian seas, the Monsoons. The ordinary power would be expended in meeting the Monsoons alone, without any power propelling the vessel. I estimate that a 1500 ton ship such as this, would require about 400 horse power to meet the Monsoons, supposing she was going against the Monsoons alone, without getting head-way; therefore, we should have a spare power of 200 horse, which would propel you about seven to eight miles an hour; therefore we should make way even against the Monsoons at seven or eight miles; but supposing we had only 400 horse power put to that vessel, we could make no way with that vessel; we should have just about enough power to stand still.

Have you made a calculation what resistance the boat would meet with to a cubic foot?

I have, as near as we can approximate.

Since you have been co-operating with me in constructing the boat that is now being described to the Committee, have you consulted any shipwright, or have any shipwrights been looking into the detail of that boat, and who?

At the time I first commenced co-operation with you in this business, I spoke to Mr. Waterman, who is the principal practical man of the Admiralty. When I first spoke to him of the magnitude of the iron boats, he discouraged me; and his recommendation at that time was, that I should abandon the thing altogether, or confine my views to something more what he called within compass, that is, to have smaller boats, and particularly if we contemplated iron. My statement was that we must either have large boats for a communication with India, or no boats at all, for it was only by large boats that they could succeed, either in meeting the difficulties, or to pay profit; and I was anxious to obtain his supervision of the general plans and assistance in getting up the drawings; and after a week's consideration, and going over my calculations, he found that they were feasible. The drawings were got up, he then went more thoroughly into it, and is now thoroughly satisfied of the

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feasibility and the practicability of much larger vessels than I contemplated. Since that Mr. Wilson has supervised the details after us.

Who is Mr. Wilson?

Mr. Wilson is another practical man at the Admiralty, and also a shipwright, who is the principal modeller, has gone through them again. Since that, Mr. Waterman and I have seen Mr. Dichborne, who is now in waiting to answer any question upon the subject. Mr. Dichborne has been the managing man for many years of Fletcher and Fearnall's—he is now in business for himself, and has been, against his own wishes, compelled almost to abandon wooden ship-building, and take up iron. He feared, in the first instance, of the feasibility of constructing, or thought it might be unadvisable to construct large vessels in the first instance, but go more gradually; and when he saw the details of the mode of construction, he was perfectly satisfied, and he has now no hesitation in recommending 1500 ton boats, or even larger, to be built of iron if necessary.

Have not Messrs. Fletcher and Fearnall, to whom Mr. Dichborne was the superintendent, built more steam-boats than any men in the River Thames?

I believe they have, and not only so, but some of the first boats now sailing were built by them.

Will you state to the Committee the other principal advantages that an iron boat will have over a wooden boat?

They are numerous. The following are some of the advantages of iron ships over those built of wood: 1st. The weight of the hull of a large wood ship would be 1500 tons, while the same size in iron would not be more than 500 tons, therefore allowing 1000 tons of cargo more than the wood ship at the same immersion. Hence, the 1500 ton ship, when built of iron, will only draw the same water with her full equipment of cargo, and her ordinary complement of coals, as a wood ship of the same size without her load. The 2nd advantage is, the first cost of a wood ship of the capacity of the 1500 ton ship would be at least £20,000 more than an iron one, including the extra machinery. 3rd. The saving in room in an iron ship is equal to a width of two-feet beam, besides the advantage in immersion. 4th. Iron ships are not so liable to be wrecked; they might, if properly built, be washed on shore, run on the coral reefs, or stranded, without sustaining any material injury; they are capable of being rendered truly safety ships, so that their sinking, or any separation of their parts, as is commonly the case in a wreck, or, as in the late calamitous loss of the Forfarshire steamer, could never occur. 5th. An iron ship is not liable to injury from hot climates, or lightning, or fire. The whole is kept cool, and in a healthy condition for the crew; it is free from vermin, nor can any damage arise to the cargo, or unhealthy odour to the passengers and crew from bilge-water; not a drop of water can get into an iron steam-boat. 6th. In wood ships, a considerable degree of elasticity exists throughout the whole structure; this elasticity, and the action of the machinery, works one against the other, with a kind of alternate action, which has a tendency to destroy each other, so that the best arranged and strongest machinery however well adapted for its work, is never to be depended on, as an extraordinary twist, or strain of the vessel, may commit damage in a single moment, which the regular work of years could not effect, and put all work to a stand, and this is most likely to be at a time when the utmost efforts were wanted. But on the other hand, the iron ship is as one solid block, or mass, having only one part; the whole will admit of a vibration, but not the slightest twist, hug, or change in the position or truth of its relative parts will ever occur; the steam machinery may be fixed immoveably in it, without any chance of its various parts working loose, or becoming twisted; here machinery can work with all the advantage of a terra firma foundation, and that is most important. Some of the best machinery that has been put into boats has been destroyed, merely from, perhaps, an extraordinary twist which has been given to the vessel in bad weather. These are the principal advantages in favour of iron over wood.

Have you got a plan in detail for a coal depôt?

I have got a diagram that I can show of the manner in which the coals are loaded.

With that plan in operation, what quantity of coals could you put into a 1500 ton boat in an hour?

Three or four hundred tons very well in an hour.

Will you show the Committee a sketch of the drawing of that depôt?

[*Mr. Holmes produced a drawing, and explained it to the Committee.*]

Chairman.] How would you propose to load the carriages which are to discharge the coals into the ship?

When the vessel comes to the depôt, it is discharged into those carriages.

How many of those carriages would you propose to keep loaded?

That depends upon the quantity required; each of those carriages will hold 110 tons.

How long would it take you to load those carriages?

That will depend upon the means employed in discharging the ship.

Suppose you are at Suez, where you have to run down a creek of two miles, how would you apply this?

At Suez this would not be important. I have not calculated upon a floating depôt, but I beg to say that every place that is important to be a station upon the line of communication between England and India, I have taken care is well adapted for this particular purpose.

Mr. *Larkins.*] It is in evidence that Captain Barber consulted you upon the formation of this plan. In that plan it is stated that the difference between an iron boat of 1500 tons and one of wood is £12,000, whereas you stated just now, that it would amount to £20,000. Can you reconcile the apparent discrepancy between the two statements?

I understand that Captain Barber has reckoned for the engines £25,500 which is the cost of the engines of the President, considering those to be 550 horse power. But when we speak of power we speak of nominal power, a power which is established in the trade. Now by that power the nominal power of the President is nearer 430 than anything else, but I believe I should be quite at the outside if I say 450. Now if we put £50 per horse upon the 150 horse additional, that comes to £7,500 and that brings Captain Barber's estimate and mine nearly to the same thing.

Mr. *Auber.*] Do you include copper boilers?

No.

You think that iron boilers would do as well in India?

Decidedly.

Chairman.] Are not they much heavier?

Not if properly constructed.

Are not they more expensive in the end?

No.

Is not the value of the copper always retained?

That is very true, and if you were to have boilers of the old fashioned form, or without compartments, merely egg-boilers or waggon-boilers, I should say perhaps that copper boilers were the cheapest, but when your object is to compress the space and have internal flues, iron boilers would be decidedly the cheapest.

Mr. *Alderman Pirie.*] You stated that the vessel would take 810 tons of coals, 780 tons of cargo, and you calculate the weight of the machinery at 500 tons, and in addition to that there is 150 tons of stores. Can you state what space of the vessel will be occupied in machinery, and what space will be left for the accommodation of passengers?

The length of the space for the machinery will be 36 feet of the ship.

Can you state what space you have allowed for the accommodation of passengers?

Ninety-four feet aft.

(*Adjourned.*)

Monday, 5th November, 1838.

PRESENT.

Captain Nairne, H.C.S.	Mr. Read.
Mr. Pirie, Alderman.	Mr. Mac Killop.
Mr. P. Auber.	Major Turner.
Mr. Larkins.	Mr. Bagshaw.
Major Oliphant.	Mr. John Small.

T. A. CURTIS, Esq., in the Chair.

Mr. *William D. Holmes* was further examined as follows:—

Mr. *Alderman Pirie.*] Upon the last day you were asked what space of the vessel would be occupied by machinery, and what space would be left for the accommodation of passengers? Will you state what will be the space for coals?

I will state the arrangements. First, I will suppose 94 feet aft, occupied in cabins, and 44 feet for the engine-room; the precise room occupied by the engines I propose is only 36, and 24 feet in length for coals. I occupy 24 feet in length, by two compartments of 12 feet each to put coals in, so that I can use one or both for coals or for cargo, as may be required; then any extra quantity of coals I propose to put in the fore hold. The two bulk-heads will hold 546 tons, and then the surplus would have to go in the fore hold under the fore cabins.

If you have too many coals a-fore, will you not bring the ship a-head?

Of course, that must be attended to; but it must be stated that we have been calculating upon a large-sized vessel, and as regards the dimensions of the largest size with the buoyancy of the whole arrangement, I have got them to the greatest nicety; but I have only had three or four days to get up the plan of 1500 ton vessels, and, therefore, as to the precise balance of the different parts I am not prepared to answer.

Chairman.] You propose to have the difference between 545 and 840 tons of coals in the fore hold.

Yes.

Mr. *Alderman Pirie.*] The extreme length of the vessel you state to be 225 feet, and you take off 94 for cabins, and 44 for machinery; therefore you say, that 138 feet will be taken up for passengers and for the machinery; that leaves remaining only 87 feet of the length of the vessel to carry the 810 tons of coals and 780 tons of cargo. Now, is it possible that 87 feet of the length of the vessel could take 1590 tons?

The coals would be under the two decks, and there is the after-hold; the hold is nine feet deep.

Mr. *Read.*] The coals would all be before the main-mast?

Yes. I calculate that 500 tons would be as much as it would be ever necessary to carry.

Major *Oliphant.*] What is the depth of the hold?

Nine feet, with two decks of eight feet each.

Mr. *Alderman Pirie.*] What is the extreme depth?

25 feet 6 from the top of the deck to the hold.

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Mr. *Read.*] If you carry so large a quantity of coals in the fore-part of the vessel, will not the balance of the vessel be destroyed as you burn them out?

Of course you have to attend to the trim of the vessel, that must in all cases be attended to when you carry so large a body of coals, otherwise you must submit to a great inconvenience in basketing them over from the after hold; but very much may be done as regards the trim of the vessel by the position of the cargo, besides, there is another point which I would submit, which, probably, may have been overlooked. Suppose we require 1000 tons of coals?—1000 tons of coals will take you the passage there and back again, and that is the largest quantity of coals that would be required. Suppose you go from Calcutta to Madras, or from Calcutta to Ceylon, you would receive cargo on board in place of the coals, and from station to station you would do it in the same way, therefore that would, to a great extent, regulate the trim of the vessel.

Mr. *Larkins.*] Would you put cargo into the coal hold?

I have made a division of the coal-box for that purpose.

Chairman.] What cargo do you suppose would go from Galle to Suez?

You could have from 150 to 200 tons at Galle.

Major *Turner.*] You are aware that the cargo would have to be fitted into sectional cases?

That is the cargo that crosses the Isthmus, which would be 150 tons, but I have not contemplated having sectional cases to receive 500 tons of cargo; we have calculated for 150 tons crossing the Isthmus in sectional cases, and the others I have calculated to be carried between the Presidencies.

Mr. *Auber.*] Supposing you were commencing a voyage from England to Alexandria in this 1500 ton vessel, what quantity of coals would you put on board?

Five hundred tons, and I should expect to have upwards of 100 tons to spare.

Chairman.] That is calculating upon how many days' voyage?

It would be twelve days and a half voyage, at ten miles an hour; 400 horse power would do that, except in unfavourable weather, and that would be 30 tons per day, to work 400 horse power.

How many pounds per horse power?

Seven pounds per horse power per hour—that would be 30 tons per day for the 400 horse.

That is supposing you have average weather, sometimes fine, and sometimes bad, but supposing it were all bad?

Then we should require 45 tons per day; if we had to expend the whole of the 600 horse power, we should only use the 45 tons per day.

Mr. *Read.*] At what rate would you go?

At the same rate; if you slacken the rate then it amounts to the same thing, because you would have a longer time, but you would not use so many coals per day.

Mr. *Bagshaw.*] Then the Committee are to understand that the contingency, upon which the quantity of coals taken would depend, is the quantity of cargo that might be going from this country to Alexandria; if no cargo offered, then it would be prudent to take 1000 tons of coals for the voyage there and back?

Yes.

Then she would have room for 500 tons of cargo home from Alexandria to this country, in addition to coals to bring her back again?

Yes.

What would be her draft of water?

With 1500 tons her immersion would be 17 feet; that is the immersion of the Great Western.

Mr. *Read.*] You stated that the vessel with those 500 tons of cargo on board will draw 17 feet. Are you speaking of an iron steamer or a wooden steamer?

An iron steamer. The Great Western draws 17 feet. We should draw no

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more water with our extraordinary quantity of cargo on board than the Great Western.

Major *Oliphant.*] Do you mean to say that you would use 400 horse power always, except when you had bad weather, and then you would add the 200 horse power?

Yes.

Are you aware that in steaming with an ordinary steamer, at present, practical seamen rather diminish than increase the power when they meet with a heavy sea and a gale of wind?

I am aware of that.

Then does it appear to you that there is any advantage in putting on the additional 200 horse power?

The reason that they reduce their steam is from the fear of straining the vessel. Now I should have no fear of straining an iron vessel. I would go against the monsoon without the least danger of straining it, and keep up the speed.

You must account in some way for practical seamen diminishing the steam in bad weather, their idea being, that by increasing the power when you have got a heavy sea and strong wind against you, the application of increased power will drive the vessel under water.

Not so much that it will drive the vessel under water, as that it will injure the vessel; if the vessel is properly constructed and properly trimmed, there is no danger of her going under water, unless she is so strained as to cause leakage. Now I will state another point. I will suppose the paddle-wheels to be too far aft, I should say in that case they might possibly drive the vessel under, but if the paddle-wheels were either a little forward or properly placed in the centre, and the vessel truly trimmed, there could be no possibility of her being driven under water.

You are aware that the Liverpool is 1000 tons, and her power of steaming is 450 horse power. This vessel met with a heavy sea, she only went one-third of her voyage, and two-thirds of her coals was expended in that time, and she was obliged to return. Now the engine that you have given to the 1500 ton vessel is as nearly as possible the same, taking the tonnage.

That is not the way to take it. The increase of a vessel in tonnage is an increase of the cubic dimensions, but only the square of resistance. The consequence is, that when you are calculating the comparative resistance of a vessel, you must consider what the sectional area is, and in order to come to the point, we must know what are the dimensions of the Liverpool, and it will be found that the Liverpool required nearly as much power as my vessel will.

Of course it is hardly possible to estimate the force of the wind and the water?

I will give the Committee the data upon which I estimate, in order to give an idea how far I have approximated to the truth. I have supposed the velocity of the monsoon to be from sixty to sixty-six feet a second, I believe that is something like the maximum rate at which they blow. I never was in the Indian seas; but this velocity is a very strong gale. It is something below a tempest--it is not a tempest, but it is one of the strongest gales of wind below a tempest that can possibly be conceived. That would be about sixty-six feet a second. Now the sectional area of my vessel above water would be 380 feet, under water 750 feet; her paddle boxes 300 feet. The consequence is, the sectional area of resistance both under water and over water will be 1250 feet. The resistance at ten miles an hour of this wind would be in round numbers ten pounds the superficial foot. The consequence would be that I should have 12,500 lbs. to meet. Now I have taken both under water and over water, at a resistance of ten pounds per foot under water. We have these two points to consider in addition. The first is the current; and the second is,—perhaps the most difficult point to form an estimate of,—the hollows formed by the waves so as to produce an uncertain action of the winds.

Is it not remarkable that the vessels already employed do not use the full extent of their steam in bad weather?

They dare not use it, and I would not attempt to use it in a wooden vessel.

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I would not attempt to meet the monsoons in the same way in any but an iron vessel.

Do not you suppose that any wooden vessel could be built sufficiently strong to bear the strain upon her?

I think it possible that they would be built, but there would be always an uncertainty, and that would make all the difference. Whoever commanded the vessel would not have confidence in her.

Do not you apprehend that the reason for diminishing the power in bad weather may be partly this, that in a lift of the wave by allowing the ship to be more buoyant, you make more use of the paddles than when you put an immense power upon her to drive her through?

I should say decidedly the reverse, because the rapid rate would meet the waves quicker. If it got into a hollow it would stand there; it might fight and fight without any means of getting through.

Mr. *Auber.*] You think that a wooden vessel is liable to straining so much as to render it necessary to reduce the power, and that an iron vessel is so strong as to bear the increase of power?

Just so.

What would be the depth from the floor where the engine would stand, to the top of the engine?

For this vessel I should make a different arrangement than I have done in a larger size.

You have stated that the vessel is to be 225 feet long. You propose to have 94 feet for the cabins, 44 for the engines, and 24 feet for the coals, and then there are 64 feet more for whatever else you please?

Yes.

The engine you propose to place in the centre of the vessel?

Yes; within a foot or eighteen inches.

What would be the draft of the vessel when the engines were in, with the engines only?

The engines and stores would be 650 tons; the draft would be 11 feet with the engines only.

Then supposing there were 1000 tons of cargo, what would that make the draft of the vessel?

It would bring her down 5 feet [illegible]½ inches; therefore she would draw 16 feet then.

Then in 94 feet of the vessel you would bring it down to 15 feet 10½ inches?

Of course; the hold, 9 feet 6 inches under the cabins is always clear.

Then in fact, you have the power of leaving 1000 tons before the engines, having also the after hold?

Yes, of course, if you take 1000 tons of coal out with you and no cargo, you must make a different arrangement for the trim of the vessel. We are now speaking of the immersion of the vessel; of course a difference in the arrangement would be required; if you take 1000 tons of coal and no cargo, of course she must take some of the coals aft, for the sake of the trim of the vessel. Whatever cargo you put in, you must pay due attention to the trim of the vessel.

Suppose it was light goods that occupied a certain space without being of the weight you required to keep the vessel in her proper trim?

All the coals would be very near the centre of the vessel, and it would not make so much difference.

Is there not a part of the coals forward?

It is true that they are forward of the centre of gravity; but still they are near the centre of gravity, with the exception of the 300 tons near the fore hold. Of course in loading a ship, these matters must be attended to. You can only make general arrangements.

Have you ever known any steamer carrying coals abaft the engine-room?

Yes, it is common enough for coals to be loaded in the after hold.

Can you name any vessel that does it?

I cannot name the vessel, but I know that several Government steamers

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have done it, and I can bring the particulars of them when I come the next time. It is a well known fact that that is the case.

Major *Turner*.] Are you aware that the compass is very much affected in an iron vessel?

I am aware that it is not affected at a certain distance from the iron. If you bring the compass within seven feet of the iron in a ship, or seven feet of any large body of iron, the compass will be affected; but it is not found to be materially affected, even independently of the improvements that have been effected by Professors Barlow and Airey, which I understand overcome all difficulties. The difference is scarcely perceptible, or in fact, is not perceptible in practice.

That is to say, they have obviated it?

They have obviated even the doubt that existed.

Mr. *Auber*.] You stated that you proposed iron boilers. How long have you known iron boilers last?

The lasting of an iron boiler depends upon so many circumstances, that I cannot consider it as a rule without the particular construction of the boiler is taken into account. If I were going to use a boiler of the old construction, a waggon-boiler or an egg-boiler, I should use a copper boiler, because the wearing out of the general surface of that boiler would be considerable. I should then have to change that boiler very frequently.

What construction of boiler do you propose?—a new species of boiler?

Not precisely a new boiler, but there have been several boilers constructed on similar principles. I have a drawing of the boiler which will exhibit the construction.

[*Mr. Holmes produced a drawing of the boiler, which he explained to the Committee.*]

How long have you known iron boilers to last?

Iron boilers with good construction will last in an ordinary way, on an average, five years.

Working 40,000 miles a year?

Yes. I should put down my tubes to last three years. I apprehend that the tubes would wear out sooner than the surface of an ordinary boiler.

Mr. *Larkins*.] How long would a copper boiler last?

A copper boiler would not last longer than an iron, but the advantage would be that the old copper would sell for a very considerable portion of the expense of a new one.

Mr. *Auber*.] Are you aware that Mr. Field said in his Evidence before the Committee of the House of Commons, that copper is the only material that can be safely used at sea for boilers?

Mr. Field was, no doubt, alluding to the old principle of boiling sea-water. Now, I say, a copper boiler would last incomparably longer than an iron boiler, if you were compelled to use sea-water without distillation, but that would not be the case here. I have contemplated the use of Hall's condensing apparatus. I should not use the sea-water without evaporation.

Then you would not use sea-water at all?

Only for the waste, and that is not indispensable, because we should get plenty of water from station to station.

Major *Turner*.] Then when you say "iron boilers," you contemplate using fresh water?

Yes.

Mr. *Auber*.] Were Hall's Condensers included in your estimate?

Yes.

What would be the expense of the 600 horse power engines?

I reckon about 45*l*. a horse.

Does that include Hall's Condensers?

The estimate I have put down includes every thing. I have put 28,480*l*. for the machinery.

Then what would be the cost of the iron vessel altogether?

The whole cost of the iron vessel would be 21,520*l*.

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Does that include masts, and spars, and every thing?

Yes.

Including all the fittings?

Yes. I will state the details. The iron-work—213 tons of iron-work at 40*l.* a ton; I can get it done for much less than that, including the work of the first rate ship-builders; that would amount to 8,520*l.* I have taken the timber-work and fittings at 9000*l.*; the rigging, anchors, cables, and those matters, at 4000*l.*

Including masts?

Yes. We have very little masts. The rigging would come into a very small compass. As regards the rigging, and those matters, I have depended upon others, but all the other I can speak to practically.

Mr. *Alderman Pirie.*] Have you any estimate of the expense of a vessel built of wood?

I have not here. I have made a general estimate about 16*l.* a ton.

Capt. *Barber.*] Will you state to the Committee what would be the difference in the capacity of burden between an iron vessel of these dimensions, and a wooden vessel?

The difference in space would be about 10,000 cubic feet in favour of the iron, that is about 250 tons.

Mr. *Alderman Pirie.*] How is it to be secured?—what kind of framing is it to have?

There are a variety of framings, but principally formed of angle iron.

Have you seen the Rainbow?

I have not seen the Rainbow, but I have seen the vessels built since the Rainbow. The vessel that went to Russia I saw.

How is she secured?

By angle iron; her plates are over-lipped.

What is the keel made of?

There is no keel at all, nor is there any keel to the Rainbow; she has got a little indentation in the middle of the plates, so as to form a kind of line down her. The plates are very slightly bent in the centre.

Do you know the tonnage?

Five hundred and eighty but the Rainbow was built especially for river purposes.

Mr. *Auber.*] You propose to have bulk-heads?

Yes, for security.

Where would the bulk-head be fixed—before the 94 feet?

I should bring up the bulk-head in the centre, longitudinally.

That is at the extremity of the 94 feet?

Exactly.

That would be a complete bulk-head?

That would be a complete bulk-head.

How should you propose to get the coal from there which you propose to stow there?

When I stated coal going there, it was merely in the event of having no cargo on board. I have no idea of having to take coal into that hold. Of course considerable inconvenience must be submitted to in that case. You must get it up through the decks.

Mr. *Alderman Pirie.*] You propose that the plates should be secured on the outside; that they should be rivetted through?

Yes.

Is there any inside sheathing at all?

Yes, it is lined with wood.

Mr. *Small.*] You were understood to say, that by putting on additional power—the whole of the 600 horse power—you could accomplish against the Monsoon as much as the vessel could perform with 400 horse power under ordinary circumstances?

No, not to that extent against the Monsoons, about seven or eight miles an hour, I reckon, against the Monsoons.

Major *Turner.*] Against any strong wind?

It must be a very strong wind to keep the vessel back to a greater extent than that.

(Adjourned.)

Saturday, 10*th November,* 1838.

PRESENT.

Mr. Larkins.	Mr. P. Auber.
Mr. C. Read.	Mr. Stewart.
Mr. John Small.	Captain Nairne, H.C.S.
Mr. Thurburn.	Major Turner.
Major Oliphant.	Mr. Mackillop.
Captain J. H. Pelly.	

T. A. CURTIS, Esq., in the Chair.

MR. JOSHUA FIELD, was examined as follows:—

Mr. Joshua Field.

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Captain *Barber.*] You are a partner in the firm of Maudslay and Field?

I am.

You have had great experience in the manufacture of marine engines?

I have.

You fitted the Great Western?

We did.

I see that the Great Western is advertised to go seven voyages to America the next year?

I believe that is the case.

I believe that will be from 42 to 45,000 miles?

It will.

You have no doubt that the machinery is quite equal to perform that task?

It is quite enough, and I think more than it is quite prudent to undertake.

Probably you would think it better economy in the end, to have a spare vessel if we were running over a very great distance, so that the boat might lie up a couple of months?

Certainly I do.

That in the end would be economy?

It would.

It would not be necessary to man that boat except the engine-room?

No.

The crew would be of no service?

No; but the principal engineer at least, and some stokers, should be attached to each spare vessel.

Chairman.] Do you mean to say that you think that 42,000 miles would be as much as a vessel ought to do; that it would distress her if she did more?

I should not say that the machinery alone would be distressed by so much work, but the people connected with the engine department would suffer from it, and during the intervals between the voyages, would be disinclined, if not incapable, of attending to those repairs, cleansings and adjustments necessary for the coming voyage.

The question refers to the machinery. Would it distress the vessel if she were to go more than 42,000 miles in a year?

Not the vessel itself; but the remark applies to the crew, though in a less degree. Unloading and taking in cargo, getting in the coal, provision, &c., is

Mr. Joshua Field. attended with great labour; but their work is less fatiguing on the voyage, and they do not suffer from high temperature as in the engine.

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That is to say, it would be liable to render her engines out of repair?

It would not only have that tendency, but leave little time to keep them in good repair.

How many miles per annum should you say would be as much as any one vessel should fairly undertake?

I should say from 30 to 40,000 miles would be very good work for any vessel to do.

You take that ranging over all kinds of weather, and all kinds of impediments?

Yes.

Mr. *Thurburn.*] And in all seasons of the year?

Yes; and year after year, except when a great repair might be necessary, then they must be laid by.

Chairman.] Would you propose in any case where you had vessels repeatedly running those long distances, to lay them by for any portion of the year for the purpose of overhauling?

They should lay by occasionally for repair, as circumstances may require.

How long would that take?

That would altogether depend upon the state of the machinery. I do not think a fixed period could be named; but when several vessels were upon the same station, opportunities regulated by circumstances might easily be afforded for one at a time to lay by for repair, that none be overworked.

What do you mean by being "overworked?"

Incessant working, without cleansing and tightening up the bearings, soon throws the whole machine into disorder.

Could not you in such a case, knowing the size of the vessels, and the size of the engines, supposing they were all the same size, and the same power, always have a set of boilers ready to replace?

Yes; that is frequently done.

So that the time required would be diminished *pro tanto.*

Yes.

Mr. *Auber.*] What time would it require to replace a set of boilers, supposing every thing to be ready.

I should say in such a vessel as you contemplate, to replace the boilers and to do such other repairs as would become necessary when new boilers are required, would take two or three months.

Chairman.] Do you mean the boilers being all ready?

Yes.

If you had the boilers to make must you add another three months?

I would require about that time to prepare the boilers.

Suppose there should be two vessels out of repair, and you had not boilers for two vessels, you would not keep boilers ready made for your own purposes?

Certainly not.

Would it be too expensive for the company to keep them?

No; it would be good economy. In the navy they have five or six vessels of same class, and they take the boilers out of one and repair them, and put them into another, and so always keep some boilers, either new or in a repaired state, ready to be put in when required.

You consider that it would be real economy to the company, that they should have a set of boats so constructed, that all the engine work should fit one as well as another?

Yes; it would be economy to do so, though not always practicable.

Mr. *Thurburn.*] Are the boilers taken out of any great value?

If they are completely worn out they are not of much value in iron.

Chairman.] Do you prefer iron?

Iron is the cheapest, and on that account is the most used.

Is it cheapest in the end?

The first cost of iron boilers is less than one-third that of copper. The sea-risk or insurance is consequently less in the same degree; but they require more frequently to be taken out for repair or renewal, causing detention to the vessel meanwhile. This, however, is not considered so objectionable in this country, the means of doing it being convenient; and as the vessel and engine require an overhaul about as often as every four or five years, this is done at the same time.

Mr. *Thurburn.*] Then for East India Steam Navigation, you would propose copper, as we have not the same means of repair in India as in this country?

For those vessels which remain out in India, I think copper would be the cheapest. We have fitted many engines for the East India Company, and they have all copper boilers, and they have remained in as long as ten or twelve years.

Mr. *Larkins.*] What is the period a copper boiler will last?

The copper boiler of the Hugh Lindsay has been in use ten years.

How long would an iron boiler in the same vessel last?

An iron boiler would require to be taken out in four years.

Chairman.] But not necessarily to be renewed?

Not altogether to be renewed, but a repair amounting to half its original cost.

Mr. *Larkins.*] What is the difference between the price of an iron and of a copper boiler?

A copper boiler is about three times the cost of an iron boiler.

When it becomes useless, it would sell for more than an iron boiler, would it not?

It would.

Chairman.] Which would you say would be preferable for running between Suez and the Indian Presidencies?

Copper.

But as far as relates to the boats that might run between this and Egypt, you would say iron?

For the reason before stated, I think so.

Major *Oliphant.*] What is the reason why it is more advantageous to have copper in India than iron?

From the great trouble of shifting them and putting other boilers in, and conveying boilers from this country to India. Boilers are most unwieldy things to carry out, and it is attended with enormous expense to put them in there, so that if a vessel could remain ten or twelve years without having the boilers taken out, great expense would be saved.

Chairman.] Are iron boilers necessarily much heavier than copper boilers?

About the same weight.

Are they larger?

No, the same size.

Mr. *Auber.*] Is there any objection in point of oxidation to iron boilers?

Iron boilers more than copper.

That is the only objection?

The only objection.

Chairman.] Is that from the effect of heat, or the effect of the water?

The effect of both, but particularly of salt water.

Mr. *Auber.*] It has been stated in evidence that iron boilers are more liable to oxidation, and more liable to be destroyed by the use of salt water than copper boilers. Do you consider that to be the case?

I do.

Do you consider that iron boilers used with Hall's Condensers will remedy that?

If fully carried out, it is an effectual remedy for the evil arising from the use of salt water within the boiler; but iron boilers at sea suffer greatly from the action of salt water from without; the bottoms decay from the action of the bilge-water; the tops and sides by water falling from the deck; the fronts from wetting the ashes; the external casing of boilers decay sooner than the internal

Mr Joshua Field.

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flues, and boilers are frequently taken out to repair these parts, while the flues are in good order.

Supposing you were going to fit out a vessel for service between Suez and Calcutta, would you prefer having copper boilers or iron boilers with Hall's Condensers?

In our present knowledge of the duration of iron boilers working with Hall's Condensers, I should say copper would be the most certain to last in the Indian seas, but when any of the iron boilers now working with Hall's Condensers shall have worn beyond the usual term of iron boilers, their condition then, and the amount of repair upon them, will best determine this question.

Chairman.] With reference to oxidation in the boilers, what effect would galvanized iron have?

We have no experience to show that, but I think the effect would be beneficial.

In case of the oxidation being diminished, I suppose that even from Suez to Calcutta you might employ iron boilers?

Yes.

Do you know anything of the experiments now taking place with Mr. Routh's new company?

I do not. I did hope that we should have had some boiler plates zinked before this time.

That is the same process?

Yes.

Mr. *Auber.*] You have brine pumps?

We have.

Do you consider that they are very efficacious in preserving boilers?

It is a very simple and effectual expedient for limiting the saltness of the water, and preventing deposit and incrustation in the boiler, and entirely supersedes the necessity of blowing off, as it is called, on the voyage.

Supposing a wooden vessel of 500 tons, with an engine of 600 horse power, should you consider that two of them would be adequate to perform the service between this and Alexandria to keep up a monthly communication, to the amount of 35,000 miles each vessel annually?

I think you would keep up that communication for some time, but when repairs became necessary, a third vessel would be required.

Mr. *Larkins.*] Supposing Hall's Condensers succeed to the extent that the inventor contemplates, would you, with reference to the climate of India, say, that an iron boiler, with Hall's Condensers, would be preferable to a copper boiler?

The climate of India would be rather against iron, all other things being the same.

Chairman.] How long have Hall's Condensers been in use?

I think about three years and a half.

Would not that be sufficient to try the experiment?

No vessel would require a boiler shifted under four years, under the worst circumstances.

Mr. *Thurburn.*] You are aware that the Government are using them just now?

Yes; they have been fitted in one vessel, and I understand they answer very well.

When you say that the copper boilers last ten years, of course there would be some repairs required in that period?

Yes, occasional repairs; but they would not be required to be taken out.

Mr. *Read.*] There is no extra expense in fitting Hall's Condensers to a copper boiler over the expense in an iron boiler?

None, as regards the condenser; but greatly, as regards the copper.

Captain *Barber.*] You now apply steam expansively?

Yes.

Do you think, in making a calculation of the probable consumption of

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fuel, taking into consideration that the vessel will sometimes sail, which is equivalent to wastage, that 7lbs. per hour per horse-power, upon the full power of the boat, is a full estimate?

'es, with well-constructed engine and boilers.

'hairman.] In all weathers, or only upon the average?

'pon the average throughout the year.

'hat is to say, in ordinary weather 7lbs. per hour per horse-power would enough?

ieven pounds an hour would be enough, with good engine and well-ointed engineers.

f you sail in bad weather, must you not increase that?

n bad weather, with a head-wind, you do not consume so much as in weather. When opposing a head-wind, a vessel cannot go so fast—the eels cannot go so fast—engines make a fewer number of strokes, and refore take less steam, and, consequently, less coal.

'aptain *Barber.*] Are you to be understood to say that you slacken ver to gain speed against a head-wind?

To.

'hairman.] You do not require more than the 7lbs. an hour, even in the st wind?

To.

'aptain *Barber.*] You are acquainted with many practical men who mand steamers. Have you ever heard of their decreasing their power ncrease their speed in any weather?

To.

upposing the vessel were going against a head-sea, with 500 horse-er, would she go fastest with the whole 500 horse-power applied, or 400 horse-power?

Vith the 500, I should say.

'ou have had some experience, because, in your evidence in 1834, you e an opinion as to iron boats. Is your opinion, from subsequent erience, still the same as it was then; or have you had reason to alter t opinion?

believe it is just the same.

Vhat is your opinion of iron boats, as compared with wooden boats?

think that iron steam-vessels will ultimately supersede wooden ones.

n iron boat of 1,500 tons, of what thickness would you build her?

think the bottom should be five-eighths or three-quarters of an inch.

o you imagine that that would break or dent in upon a rock?

dare say it would bulge in a little.

'ou do not think it would break or snap?

Tot if the iron be of good quality.

bout what would be the difference of weight between an iron boat and ooden boat?

am not prepared to answer that off-hand; but I think an iron vessel ild be about two-thirds the weight of a wooden one of equal strength.

'hen, consequently, an iron boat would draw much less water?

'es, proportionably.

nd you would obtain greater speed with the same power?

'es; having less resistance and the same power.

'hen an iron boat of the same dimensions as a wooden boat, from outside utside, would also have considerably more capacity?

'es; by the thickness of the timbers.

'ou state that the bilge-water in wooden boats is apt to get to the boilers destroy them. Do not you consider that that could not be the case in iron boat?

f there be any difference between a wood and an iron vessel in this pect, I think it would be in favour of the iron.

'ou are accustomed to make iron boilers that will stand a very con-

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siderable pressure. Is there any outward pressure that an iron boat could come into contact with equal to the pressure of an iron boiler?

The pressure of the bottom of an iron vessel is that due to a column of water equal to the load draft; it never can be so great as the plates and rivets of steam boilers have frequently to sustain; but as the surface acted upon is large, the plate should be well supported by frames or ribs of angle iron inside.

A low pressure boiler is made perfectly tight?
Yes.

You think an iron boat might be made the same?
Certainly.

Do you think that if two boats, one of wood and the other of iron, should be on shore together upon rocks, beating hard, the wooden or the iron boat would go to pieces first?
The wooden vessel would go to pieces first; but we have to learn, what the precise effect would be upon an iron boat.

Mr. *Auber.*] Are you aware of the largest iron boat that has been built at present?
I think the Rainbow is the largest steam-boat.

Do you know her tonnage?
Five hundred and eighty-two tons builder's measurement.

Capt. *Barber.*] Suppose an iron boat built of the tonnage of 1,500 tons, and a wooden boat of the tonnage of 1,500 tons; in which boat do you think the machinery would wear longest, taking into consideration the counteraction against the machinery of the working of the two vessels?
It would depend very much upon the goodness of the construction and the working of the machinery; but I should think, if they were both equally well constructed, the iron would be the strongest and most lasting.

Mr. *Auber.*] Should you be prepared, from what you know of iron boats, to recommend an iron boat of 1,500 tons?
The subject is quite in its infancy. Building iron vessels required, at present, the combined efforts of shipwrights and boiler-makers. These parties are quite new to each other, and it will be some time before they fully amalgamate, or before a new class of plate-workers are formed, having some knowledge of ship-building, or shipwrights capable of working in iron.

Mr. *Larkins.*] Supposing an iron steamer were to be employed in keeping up a communication between Calcutta and Suez; if she met with any accident, would there be any difficulty in India in getting an iron steamer repaired under those circumstances?
There might be some difficulty in the present state of the art; but as it advances those difficulties will be removed.

Mr. *Auber.*] Are you aware of the greatest power of engine that is in use now?
The Great Western and the Liverpool, which lately sailed, are the two largest afloat.

Four hundred horse-power?
They are called 450 horse-power.

You are not aware of any such power as 600 horse?
No; there is not any vessel having that power.

What should you think of a vessel of 1,500 tons, with an engine of 600 horse-power on board; should you be prepared to recommend a vessel of that kind?
I am hardly prepared to recommend it at present, because, as I before stated, the requisite workmen to execute such a vessel, properly, are not yet organized, and I know not where sufficient numbers are to be found.

Chairman.] Should you think that 600 horse-power was an excessive power, or the right power for a 1,500 ton steamer?
It would be a good proportion for a very fast vessel.

Mr. *Auber.*] Should you think 400 horse-power adequate to propel a steamer of 1,500 tons?

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It would; but of course not so fast as the larger power.

Chairman.] Do you take a horse-power to two tons and a half; is that your proportion generally?

From two to three tons per horse-power.

You decrease the proportion as the vessel increases in size?

River boats have very great power in proportion to their tonnage, because speed in smooth water is the sole object; but ships going to sea, requiring capacity for coal, have less power in proportion to their tonnage.

Captain *Barber.*] Supposing the ship could carry fuel sufficient for 600 horse-power, do you think that you could secure regularity and dispatch by having that amount of power rather than less?

Certainly; because you are not obliged always to use its utmost power; you may use it to any extent that you determine upon.

Chairman.] What would be the ordinary power under such circumstances that a vessel of 1,500 tons would require?

In fine weather, perhaps half or two-thirds the power; and, in bad weather, as much as should be convenient.

That would be 300 in fine weather; and, in bad weather, the whole power?

Yes; I would remark that, for such steamers as you contemplate, it is good in principle to have cylinders or engines large in proportion to the boilers, that, when working against a head-wind, and the speed of the engine reduced thereby, the cylinders would take the whole steam generated by the boilers, and exert its utmost power; but when working in fine weather or fair wind, the steam should be applied so expansively as just to consume the whole; thus the boiler would at all times be the measure of the power, which is not the case at present, when the boilers are sufficient for fair weather and full speed, they are too large for the cylinders at their reduced speed in bad weather.

Major *Oliphant.*] Have you any experience to that effect, or do you learn it from practical seamen?

I have always had this idea, but it is confirmed by the recent voyages of the Great Western.

Captain *Nairne.*] Do you think that a vessel of 1,500 tons, in a heavy gale, would be enabled to bear the pressure of 600 horse-power without straining, if 300 horse-power would be sufficient to propel her?

She must be built strong enough to bear the ultimate power of the engines. Then, as to the possibility of pushing such a vessel against a head-sea with her full power, is a question depending upon the quantity of sea up, and the qualities of the vessel as a sea-boat, there is some doubt on the subject, a great power being available against a head-sea.

Chairman.] Are you aware what will be the power of the British Queen?

I believe, seventy-six-inch cylinders; the Great Western is seventy-three.

How does that increase the power per horse?

It makes about fifty or sixty horse-power more.

So that will be about 490 to 500 horse-power to propel a vessel of 1,800 tons?

Yes.

Then why do you think that 600 horse-power would be required for a 1,500 ton vessel?

Only because the maximum speed has not yet been attained; and the advantages of Steam Navigation are increased with speed.

Mr. *Auber.*] What would be the cost of engines of 600 horse-power, with iron boilers?

About 50*l.* per horse-power.

Chairman.] With respect to iron boats, you say that you should use from five-eights to three-quarters of an inch iron for the bottom. Does not iron, when it is made of a certain thickness, become brittle, and become liable to snap and break?

I think there is no danger to be apprehended from that with good iron, and well supported within by cross ribs.

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What would be the size of the plates?

About eight feet long and two feet wide.

Do you think that would be sufficient to prevent brittleness?

The size of the plate does not affect the brittleness, but is limited to that which can be rolled and conveniently worked.

Suppose a steam-boat, going at the rate of five or six knots, was to strike upon a rock?

I am not prepared to say what the consequence would be.

Captain *Barber.*] Do you think the effect would be a hole, or a dent?

A dent, certainly; and I should fear a hole if the blow should be very violent. I would remark, that in several cases in which steam-ships have been wrecked on rocks and gone to pieces, the boiler has survived every other part, and some such remains are to be seen. This leads us to suppose, that an iron vessel would not go to pieces like a wooden one.

Chairman.] Do you think that galvanizing the iron would make it more brittle?

I see no reason to suppose it would.

It would not destroy its toughness at all?

No.

But it would have all the effect of preventing oxidation?

I think it would in a very great degree.

Captain *Nairne.*] From what you know of ships built in the usual way, of wood and of iron, what difference do you think there would be in the event of a vessel in the river, for example, settling down upon her anchor; do you suppose that it would easier go through the bottom of an iron vessel, or of a wooden vessel?

It would depend upon the hardness or the softness of the soil. It is difficult to answer that question.

Chairman.] Would there be, in your estimation, any difference in the speed between a vessel built of iron and a vessel built of wood having the same power?

I think much the same; I do not see any reason to expect any difference, supposing the same draught of water and the same form.

But you say the iron would be one-third lighter, and therefore would not have the same draught of water; and therefore there would be an increase of speed?

Yes; that gives iron the advantage.

It has been stated in the Evidence before the House of Commons, that an iron boat only weighs one-third of a wooden boat?

For river vessels; but, I think, iron vessels strong enough for sea will be found nearer two-thirds the weight of wood.

Of course she would have increased speed with the same power?

Yes.

What would be the proportionate increase, in your estimation?

It is difficult to state; it would not be in proportion to that; a less engine would produce the same speed—the same engine would produce greater speed.

Then the Committee are to understand that, supposing we were to build an iron vessel of 1,500 tons, 400 or 500 horse-power would do as much as 600 horse-power with a wooden vessel?

It would be about in that proportion.

What would be the weight of the engines of 600 horse-power?

About 500 tons.

What is the weight of the engines of the Great Western?

About 400 tons, including water and boilers, and all the apparatus.

Mr. *Thurburn.*] You said, that 7lbs. of coal per horse-power per hour would be enough, you mean actual consumption?

Yes.

Without making any allowances for wastage?

I think 7lbs. per horse-power would cover for waste.

Do you think that would be sufficient in the East Indies, from Suez to Calcutta, or elsewhere, in those seas; would it not be more there than in this country?

I cannot tell what the wastage there would be: I suppose it would be as we find it here.

Would not the transport of coals from hence to such a distance have a tendency to produce wastage?

Yes, it would.

And, therefore, 7lbs. would not be a fair calculation for us to put down for actual consumption in those seas?

Perhaps more allowance should be made in the Red Sea, if there is much transhipment, and also for deterioration.

Chairman.] Should you say, that it would be possible to have shifting paddles?

They are always made to shift; but the labour of taking them off is great, and dangerous in bad weather.

Can you take them off easily?

Yes, very easily, except in bad weather.

Without danger?

Not without danger in bad weather at sea.

It would not be in bad weather that they were wanted to be taken off?

It would be desirable sometimes to detach the wheels in case of derangement in the engine, or to sail without the engine when the wind is fair; this is sometimes done by disconnecting the crank pins, which allows the wheels to revolve freely, and would be more often done were it not for the difficulty of attaching them again in blowing weather. We are now making an apparatus expressly for this purpose, for several vessels fitting for the East India Company.

Was not that done with the Medea?

Yes; the Medea had the means of disconnecting the wheels, but not the apparatus alluded to for holding the wheels fast and connecting them in bad weather.

Mr. *Auber.*] With regard to the comparative safety, you are aware that the proposed boat is to be 225 feet in length, and as each plate is to be eight feet in length, it will have twenty-eight plates on each side: do you consider that a boat so constructed of iron to that extent, with the plates overlapping of course, as they are now made, would be, as compared with wood, equally safe, as far as fastening and construction goes?

I think so; all the joints would be crossed.

Chairman.] Could you, by any experience you have now got, form any thing like a guess of what would be the expense of building an iron steamboat of 1,500 tons?

I am not prepared to state that.

Have you any calculation per ton that would be a safe guide?

The iron steam-boats hitherto built have been for rivers, and very light vessels for the most part, and then they are considerably cheaper than wood.

Are there any iron boats in the Irish trade, between Liverpool and Ireland?

There are iron boats, but not between Liverpool and Ireland.

What Irish boats are there of iron?

There are several mentioned in Mr. Laird's Evidence—the Gally Owen is one.

What is her size?

I do not know—it is stated in Mr. Laird's Evidence.

Mr. *Thurburn.*] How many engineers would you recommend for a vessel of that size, of 1,500 tons, with 600 horse-power?

I think there should be six.

Would four be enough for 400 horse-power?

They have five in the Great Western.

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How many stokers?
They would require eighteen or twenty.

That number would be greatly increased in a warm climate?
It would.

You would have more engineers there than you would have here?
Yes.

Mr. *Larkins.*] Were you rightly understood, to say that the expense of building large iron steamers would be greatly more in proportion than that of building small ones?
I am not prepared to say: very few iron steamers of any magnitude have yet been built.

Chairman.] What proportion in the vessel would the engines and engine-room, and every thing belonging to the vessel, take up in a vessel of 1,500 tons, supposing she was 600 horse-power?
I think the machinery might be brought into sixty feet.

But not less than that?
Not less than that.

And with a 430 horse-power?
About fifty: the engines might be crowded into less space, but there would be disadvantages equal to the saving of space.

Captain *Barber.*] Do you think that in putting an engine into an iron boat, you would not make it lighter in substance than in a wooden boat?
No.

You would not make any allowance for the working of the wooden boat which you would not make in an iron boat?
No.

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Mr. CHRISTOPHER CLAXTON was examined as follows: —

Captain *Barber.*] You are intimately acquainted with the Great Western, which goes from Bristol to New York?
Yes.

Do you consider, as a sailor, and having great experience in the Atlantic, that the strain would be most, taking the year round, in steaming from Bristol to New York, or from Bristol to Alexandria?
I should think that, taking the year round, the strain from Bristol to New York would be twice as much as it would be from Bristol to Alexandria.

Chairman.] You take out of the account the Bay of Biscay?
That is only 1,000 miles in the voyage to Gibraltar.

Are you taking the departure from Bristol, or are you taking it from Southampton?
I am taking it where of course you mean to depart from, which is Bristol; we take it for granted that you will come to Bristol.

Captain *Barber.*] You consider the wear and tear of a steam-vessel between England and New York to be very much greater than that between England and Alexandria?
Yes; I should explain it in this way: the Great Western, on her last voyage, had thirteen days and a half of dead westerly wind against her. Now, she was only sixteen days on her passage. That thirteen days and a half would have taken her half way up the Mediterranean, even with the wind against her, a south-western, which is the prevailing wind; it would have been a fair wind for her after getting round to Gibraltar, and we know that it blows that way nine months of the year; it would have been only a foul wind for her the first five days.

How many days' fuel do you carry in the Great Western?
I should say, judging by the expenditure of the Great Western, that we carry twenty-four days' fuel for full steaming.

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How many tons of cargo have you capacity for in carrying twenty-four days' fuel?

About 140 tons; twenty-six tons a day is about the average of her consumption, and she took about 640 tons of coal.

How many passengers can you take?

Comfortably, we cannot take more than 130; we have had 140.

You have double cabins?

All the American vessels have two bed-places in a cabin, unless the taker chooses to pay for the whole cabin to himself, and then he has taken off one-third of the price; we are unfortunate rather in the Great Western, because we have accommodation below, which people do not like, and we do not fill equal to our accommodation; that is to say, we are obliged to let people have those for whole cabins which were intended for two, and therefore that takes off sixteen passengers; we know better now.

How many of those berths are for gentlemen?

They are just the same; only, if a lady takes a berth, there must be another lady in it; and she would have it to herself if there was not a lady. We have no room with bed-places round it. They are cabins with two bed-places. Every cabin is a private cabin.

What is the size of those cabins?

Six feet by six and a half long, and nine feet high.

Do they close in with doors?

Yes.

Have they lights?

Yes.

How many do you contemplate carrying in the sister ship to the Great Western?

We shall carry more than 200 first-class passengers.

Chairman.] With the same sized vessel?

No; we are going to increase our size very considerably.

Mr. *Auber.*] Shall you make the cabins larger?

No; but we shall have more of them, and two places to live in instead of one.

What is your present size?

One thousand three hundred and forty tons.

Captain *Barber.*] You went across the other day to Antwerp, in the Rainbow?

I did.

Has your experience of the passage to and from Antwerp, in that boat, inclined you to think that an iron boat will be better than a wooden boat of the size that has been mentioned?

I should not say that the experience of that passage would have made any difference in my feeling upon that point; I preferred an iron boat before I made the passage.

Chairman.] The experience of that passage would not have led you to prefer iron to wood?

It has not altered my opinion upon that subject, but I satisfied myself of the great point I wanted to be satisfied about, which is the compass; that was the main object of my going; all the rest I knew before.

Captain *Barber.*] Is it your opinion that an iron boat of 1,500 tons would be preferable to a boat of wood?

Most decidedly.

Will you state your reasons for so thinking?

I think they can be made to go faster, and they can be built cheaper; they require, in comparison to their tonnage, less power; there is a great gain in capacity. The difference between the Great Western in iron and the Great Western in wood would be 300 tons in stowage. We are obliged to shut out more than 150 tons of goods now at Bristol every voyage, and people would pay 10*l.* or 15*l.* a ton for their goods, rather than shut them out for so short a passage; and it may be conceived what that would amount to at 10*l.* a ton. In an iron vessel, there is no bilge-water; there is no kind of smell in the vessel; the iron does not make the water stink; the vermin have no place to live in. You must of course have wooden accommodations, whether it is iron or not; but rats and mice would find no place to live in; or any of those horrid centipedes and things of that kind which you meet with in warm climates. And as for strength, I think an iron boat may be made of any strength you like to have it.

Was there any difference perceptible in the vibration?

We had a stiffish gale coming over; the sea had not quite got up to what I wanted it to get up to; it was West-north-west, and our course due west; but she was very lively; nothing could be more lively, and nothing could be drier than she was; and as to vibration, I do not think there was half the vibration there is of ordinary wooden vessels.

Chairman.] You said that you wanted to satisfy yourself upon the compass. Do you think there is opportunity enough between London and Antwerp to try that effect?

I think it would not certainly be so good as a voyage across the Line and back again. I should like to hear of a vessel that went to the Cape and back again, to see whether it altered in different climates, and especially where there is more magnetic influence. But as between London and Antwerp, the compass was as correct as any compass in the world, because I kept the reckoning, and had a chart; there is a vessel just gone out for the Emperor of Russia, and there is one just gone to the Pacha, and I think I can count seven or eight and twenty iron packets now going.

Do you know what the size of the largest is?

The largest is 407 tons; that is the Rainbow. The actual builder's tonnage of the Rainbow is 407 tons, of which 144 tons belong to the engine.

Was your compass made in a peculiar way, in consequence of any experiment which has been made by Professor Airey?

Yes, it was; and I can explain it.

Was there an ordinary compass by the side of it?

Yes; I took two.

What was the effect upon the ordinary compass?

I had two compasses; one appeared to be more steady than the other; and for no theoretical reason that I can give; but it was so; I suppose it was better hung; but the fact was, that one was only wrong a point, and the other was occasionally wrong five or six points.

Perhaps it was the better one that was only wrong a point?

No; I could correct them by the good ones. There were two of Professor Airey's adjusted compasses on board, and by trying those two, which perfectly agreed with one another, we could tell which was wrong. Besides, I moved Professor Airey's compass out of its own binnacle, and then it was wrong and mine was right; and therefore the same correction that did for one did for the other.

You have no knowledge as to the durability of the means adopted by Professor Airey to prevent the affection of the needle?

Yes; I know it all pretty well, except what he has got in a little box, under which is the magnet; I do not know how highly charged it is. Here is a drawing of Professor Airey's compass.

(Mr. *Claxton produced a drawing and explained it to the Committee.*)

Chairman.] Do you apprehend that time would make any difference in this magnetic effect?

I do not know; that is too scientific a question for me; but I should say it would be always ascertained from the ship's reckoning, and by the stars. For myself, I should not be afraid of going without a compass. You can always correct the compass, and always ascertain whether you are going right. Every vessel you pass you can hail them, "How are you steering?"

Mr. *Thurburn.*] You have invited us to come to Bristol. What accommodation can you give us there?

We are going to Parliament for a bill to increase our gates to 70 feet.

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There would be no difficulty in a ship of 1500 tons going up to Bristol?

I do not apprehend there will be any difficulty with the ship we shall bring up.

Chairman.] Is there any quarantine ground at Bristol, or must you lie out in the Severn?

We must lie out in the Severn.

Is not it sometimes rather rough there?

We have never had the Great Western anywhere else, and we have managed in eight days to get all her coals on board, and the passengers and the cargo.

Did she never come up the Avon?

No.

Mr. *Thurburn.*] If the departure took place from Bristol, the gentlemen there are so very patriotic that we should derive great assistance from that city?

No doubt.

We might expect a subscription there of 100,000*l.*?

You must first let us know how much you have got here, and we would get a subscription in proportion.

We might expect the hearty co-operation of the city of Bristol?

Yes, and a great deal more. I think 80 or 90 of our proprietors, out of 140, in the Great Western Steam-ship Company, have petitioned us to take the thing in hand.

To take it in hand as far as Alexandria?

Yes. The truth is, we think we are in the best place very considerably for Atlantic steaming. You can come into Bristol any water that flows; and then the coal is a great question—we have the best coal near.

Chairman.] Why does not the Great Western come into the Avon every trip?

Because the dock-gates are not wide enough, and she would lie a-ground in the Avon.

Mr. *Thurburn.*] Is not another objection the tonnage dues?

That, I think, is coming to a close. They do not charge us because we cannot come in; and as we are going to increase our concern, and in half a dozen other ways the Company is increasing, it is for their interest now to let us in, and at this moment they are now pressing forward their petition for an Act of Parliament.

Chairman.] Where is the quarantine ground in the Severn?

In the King's road. It is beautiful anchorage.

Mr. *Thurburn.*] How do you get the coals?—Do you send the steamer to any port—to Swansea, for example?

No; we bring the coals alongside; we put our coals on board very low from Newport.

You think Newport coals are quite as good?

I think better. The Great Western has taken out all one sort of coals from Tredegar; they took out last time 300 tons of it.

Are you aware of the Gregola coal being very much prized?

Quite aware; we sent 560 tons of it to New-York the month before last for the Great Western.

Do you think the Newport coal equal to it?

Yes, better; because it does not burn so fast.

Is it equally cheap with the other?

The same price, with this difference, that we cannot get the Gregola without half-a-crown more freight to Bristol; we get the Tredegar at half-a-crown freight.

It was stated that the Great Western, in coming home last time, had Liverpool coal; was that the case?

Yes, it was; it was a bad job—she would have made her passage a day sooner if she had not had it. We bought 400 tons of it; our average consumption of our own coal is 26 tons; we frequently consumed 40 tons of that Liverpool coal, and 35 was the average.

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Mr. *Auber.*] At what rate have you put the Tredegar coal on board?

11*s.* 3*d.* a ton, put on board, all expenses paid.

Mr. *Thurburn.*] As you cannot at present get up to Bristol, you make use of small steamers to take the passengers and luggage?

Yes; and we should still use the same steamers if we could get up to Bristol, unless we arrived at a very lucky moment when we could get the ship up at high water, because we would not keep them half an hour in King's Road.

Chairman.] What is the fall of the tide?

50 feet sometimes.

So that a steamer could not come in at all tides?

A steamer can come in at two-thirds tide.

Mr. *Thurburn.*] How would the people at Bristol propose to co-operate with this Company, as a body or as individuals?

I should say as individuals taking shares; that if you made Bristol the port, that is all they would ask to let them in as shareholders.

Do you mean to Alexandria or the whole line?

If the Bristol people came in, they would be the same as you are; but I do not believe there is any man at Bristol that would ask to have anything to do with the direction, if you would only make Bristol the port.

Major *Oliphant.*] Have you ever experienced such bad weather in the Great Western as to be unable to make way against the wind?

The worst weather that we know she has experienced was on Monday week last, and she was then seen by a ship that arrived at Bristol. That ship was under a reefed fore-sail, and a close reefed main top-sail, scudding, and wanting the main top-sail off her, which they could not take off,—they were afraid of splitting it,—and they say the Great Western was steering and going along gallantly. The only question I asked was, had she any after-sail set? because she was going head to wind. Steamers that have not power enough generally fall off a few points, but then they set after-sail to the wind. She had none set, which is a proof that she was doing very well.

You yourself have not commanded a steamer?

No; I have been in the Great Western from London to Bristol.

Are you aware that in bad weather the power is sometimes diminished?

I know that it is not all used, the power is not diminished, but the steam is not used; the cylinder, not making so many strokes, does not take so much steam, and you may lower the fires.

Then do you consider that having an engine sufficient to propel a vessel ten knots in fine weather, you would have any advantage by having a more powerful engine to cope with bad weather?

Yes; I should like the Great Western to be 100 horse-power more.

Is that to propel her at a greater rate in fine weather?

She would go at a greater rate in fine weather; but that is not my reason. I do not know what this last voyage will turn out to have been; but she had a very heavy wind on the banks of Newfoundland, and it brought her to five knots dead on, and but, I think, with greater power, she would have kept at six.

Do not you think that a greater power would drive her through the wave?

No; if you build your vessel upon that kind of model as to be a fine lively sea-boat, she will not go through the wave; she will go over it, let it be ever so bad. It is something like vessels riding in tremendous weather in open roadsteads; the current will run by them; they never ship seas, they throw it off upon their bows; and I take steaming to be something like it. The Great Western does not ship any sea; she goes very easy, and rises; she throws nothing but spray over.

Mr. *Auber.*] You have never commanded a steamer?

Never. I have been in a great many.

Major *Oliphant.*] Are you aware that in some of the Gibraltar steamers their habit is not in bad weather to put on the whole power of steam?

It becomes a question whether the vessel can stand it. If you can build

Mr. C. Claxton.

10th Nov. 1838.

the vessel strong enough to stand it, it is clear that the straighter the course you steer the quicker you make your passage; but if there is any fear on the part of the captain of the ship that he is unnecessarily driving the ship and distressing her, he will keep her away perhaps two or three points, and put canvass upon her, and then he will come to half speed, and make her, as it were, a steaming and a sailing vessel too. That is what they have done in all the vessels alluded to.

Are you aware that in the Red Sea against the monsoon the practice has been to keep up the full power of the steam upon those vessels, and that they have never yet made the point they wished to make, but have always been obliged to return, and that practical men have stated that if they had applied only half the power they would have accomplished the object?

I should like to know what made them come back. The Berenice broke her shaft; that was a bad shaft. I suppose they must have been brought to a stand-still; and if they had lessened their fuel they must have gone a-stern.

The following Questions to and Answers from MR. HALL *were put in by Captain Barber.*

Mr. Hall's Opinions.

Have you turned your attention to Steam Navigation?

I have; but more particularly to the machinery.

Vessels being required to keep up a monthly communication between England and Alexandria with the greatest practicable despatch, capable of carrying eighteen days' fuel and 150 tons of cargo, and 100 cabin passengers, their accommodation to be good and spacious, what tonnage (builder's) and what power would you recommend?

I am of opinion, that vessels of 1,500 or 1,600 tons would be of a suitable size, and in that case, that engines with eighty-inch cylinders and a seven-feet stroke would possess ample power, being, according to the usual acceptation of the term, of about 540 horse; I consider it desirable to have this power, not that it will be generally required to be used, but for the purpose of being available in stormy weather; and with this view the engines should be made to work the steam expansively to as great a degree as convenient in favourable weather, whereby a great saving of steam, and of course of fuel, will be effected; the engines at the same time working up to a sufficient power.

How many such vessels would you recommend should be provided, in order that the communication should be insured?

Of this I am not a competent judge, not having turned my attention to the point.

How many miles of steaming would such a vessel be capable of performing in the year, with stages of 3,000 miles, and seventeen days' rest between each stage, taking into consideration, the engines would be occasionally eased by fair winds?

This so much depends upon circumstances that I shall merely state, that engines whose boilers are supplied with pure distilled water do not require frequent rest, as is the case with those whose boilers are supplied with salt water, which consequently frequently require to be emptied for the purpose of cleaning them and chipping off the hard incrustations which are deposited from the water and firmly adhere to the sides of the boilers and tops of the flues.

What average rate of speed would such a boat obtain over a run of 3,000 miles?

I am very sanguine upon this point. It is so well known what has been effected between this country and the United States, that I need not here state it. My opinion is, that the average rate of speed will be very considerably increased, and more particularly the comparative speed in bad weather, when the engines are liable to be water-logged, and their power thereby to be much decreased.

What would be the cost of the machinery for the vessel you have named, fitted with the best material in the best way, with iron boilers, and Hall's patent condensers?

Mr. Hall's Opinions.

The cost of the machinery by one of the best makers of marine steam engines in the kingdom, would be 25,500*l.*, if the engines be of the size and description which I have pointed out, and as described in this question.

What would be the objections to building boats, of the size you have named, of iron? What would be the advantage of iron boats, supposing these objections did not exist? How long do you think an iron boat would last? How long a wooden one?

Although I have formed my own opinions upon the comparative merits of vessels built of wood and of those constructed of iron, I do not consider my opinions deserving of much weight; I, therefore, prefer confining my answers to questions upon those subjects upon which I can speak with confidence, arising from ample experience.

Much of the consumption of fuel depends upon the stokers. In America they use a machine to feed the furnace, by which means any boy may be an expert stoker, and that great saving of fuel is the consequence—what is your opinion?

I do not think that the use of any apparatus at present in existence (or at least with which I am acquainted) for supplying furnaces with fuel, would be practicable where so many fires are required, as would be needful with a pair of marine engines of 500 horse-power, the same having to be subjected to the lurching motions of the vessel caused by stormy weather. Theoretically, some of the plans proposed, and even used in stationary engines, may appear good; but, certainly, they would not be found so practically in marine engines.

What would be the consumption of coal per horse-power per hour, allowing the assistance of winds to be equivalent to the wastage?—Welsh, Newcastle, Anthracite. Are there any objections to use the last-named?

I have not the least doubt but a pair of engines, as above described, may be worked up to 400 horse-power, which is quite sufficient in fine weather, with 15 cwt. of Newcastle coal per hour, or about 4 lbs. per horse-power, if the process of supplying pure water to the boilers be adopted, and the other improvements which I have laid before the Committee on Steam Navigation to India *viâ* the Red Sea. Some sorts of Welsh coal answer nearly as well as the Newcastle coal, in some furnaces in which it will burn freely, which, however, is not the case with all boilers.

Do you know they are now in America using the Anthracite coal with great success in Steam Navigation?

The coal of this country, termed Anthracite, is very different to the coal bearing that name in the United States; at any rate, a few casks which I imported from thence a short time ago for experimenting upon was very different, being more incombustible.

Are the vessels to which your replies refer, to be constructed with reference to their constant struggle with the elements for lengthened periods; or, are they laid off with reference solely to those which have sufficed for our narrow seas and short passages?

In what I have stated, I have entirely had in view Steam Navigation of the first-mentioned description; viz. That in which vessels have to encounter a "constant struggle with the elements for lengthened periods."

In addition to my replies to the above questions, I take the liberty of stating that, having examined, with considerable attention, the comprehensive plan, now under consideration, of Steam Communication with India *viâ* the Red Sea, I am convinced that it is practicable, and will, if vigorously adopted, be successful and profitable.

In conclusion, I beg to refer to my letter of 19th October to the Committee, and to state that I shall, in a few days, be able to show the advantages in steam-engine boilers as therein mentioned, by showing a large one in operation.

SAMUEL HALL, Civil Engineer,
Basford, near Nottingham.

(*Adjourned.*)

Monday, 12th November, 1838.

PRESENT.

Mr. Stewart.	Captain Nairne.
Major Oliphant.	Mr. J. H. Pelly.
Mr. Auber.	Mr. J. P. Larkins.
Mr. Read.	Major Turner.
Mr. R. Thurburn.	Mr. Small.

T. A. CURTIS, Esq., in the Chair.

Mr. WILLIAM FAIRBAIRN was examined as follows:

Mr. W. Fairbairn.

12th Nov. 1838.

Chairman.] You are of the firm of William Fairbairn & Co., Engineers, at Mill-wall?

Yes.

You are a civil engineer?

Yes.

Are you acquainted with iron steam-boat building?

Yes.

But not with wooden steam-boat building?

Not at all.

You have confined your practice entirely to iron steam-boat building?

Entirely.

What steam-boats have you built?

Five for Scotland; and, in the first instance, upon a small scale, for a canal, and for the Firth of Forth; we have built two for the Humber; and four for Switzerland; and two for Russia; and one we have upon the stocks; and we have now ten vessels for the Ganges, for the East India Company.

What is the largest sized steam-boat you have ever built?

Two hundred and fifty tons, that is the Lancashire Witch.

Are you aware of there being any boat of larger size than that?

Yes; the Rainbow is much larger.

Is she the largest iron steam-boat there is?

I think not; I think there are two building in Glasgow larger than the Rainbow; I do not know the dimensions, but I have been informed that they are of larger tonnage than the Rainbow.

Are you of opinion that an iron steam-boat could be made of any size?

I have no doubt of it; and I am of opinion that iron is a very superior material for ship-building to wood; I have been convinced of that ever since I commenced building of iron.

Would you think an iron steam-boat of 1,500 tons too large?

Not at all; nor even larger.

If you were to build a boat of 1,500 tons, what power would you have?

Not less than 500 horse.

Would you confine yourself to 500 horse, or would you have it more?

I would not go much above 500 horse.

What would be the length of a steam-boat of 1,500 tons, with 500 horse-power?

I would propose about 220 feet, and 38 feet beam, 24 feet in depth, and about 62 feet over the paddle-boxes, her extreme breadth.

What would be the room you would take up for the engines?

We should require, for the engines and boilers, and accommodation for sufficient room for firing, about 80 feet out of the 220.

Mr. W. Fairbairn.

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Does that include stowage for fuel?

Yes, it does, for 800 tons of coal.

How much of that goes for coals?

I suppose, from 10 to 12 feet.

What quantity of fuel do you propose to stow in that?

Eight hundred tons.

What length of voyage do you calculate that 800 tons would be sufficient for?

I have not made out that part of the calculation.

How much space would you have for cabin?

We should have, in that case, about 70 feet abaft, and 70 feet forward, and the forecastle would require to be taken off.

Would you have a clear run of 70 feet aft?

I suppose you would require the well of the hold for goods, to be taken off that, and probably it would not be more than 60 feet aft.

How do you divide the fore part?

Into a fore-hold, a large steerage cabin, and accommodation for the crew on board the vessel.

How much of that do you propose for passengers?

That would depend, in a great measure, upon the plan of the vessel; there is such a variety of ways of dividing vessels in that respect, to suit the probable number of passengers.

Whereabouts would be the stowage of the coal?

I propose to take about 12 feet of the whole width of the vessel, and also to stow in the hold.

Not forward?

No, as little forward as you can.

Mr. *Auber.*] Is the 80 feet occupied by the engines and the coal taken out of the centre of the ship, leaving 70 feet abaft and forward for other purposes?

I suppose it to be about the centre.

Mr. *Larkins.*] The 220 feet in length is between perpendicular, I suppose?

Between the perpendiculars.

Chairman.] What would be the immersion of a steam-boat of that size, with her 800 tons of coal aboard?

My calculation is that her immersion would be 14 feet, and her displacement would be equal to 2,260 tons; that would include the hull, decks, rigging, steam-engines, water in the boilers, stores, and 350 tons of goods, including the passengers, and 800 tons of coal.

How many passengers do you include in that?

I take the passengers at about forty to fifty tons, and I suppose that the goods might be 300 tons.

Besides ship stores?

Yes.

Do you propose to have tanks?

Yes. It would also be a consideration whether Hall's condensers would be used, and distilling apparatus.

You say the immersion would be 14 feet; what would be the immersion of a wooden vessel of the same size, and with the same cargo, under all similar circumstances, except being made of wood?

I should apprehend from 15 feet 6 inches to 16 feet.

Therefore the difference would be about two feet?

Probably from twenty inches to two feet, but I have not computed that with accuracy.

Have you calculated what would be the weight of an iron vessel of that kind?

Yes. With her steam engines, and decks and rigging, and altogether, I calculate the total weight to be 1,110 tons.

What would a wooden vessel of that size, under the same circumstances, weigh?

From 1400 to 1500 tons. The comparative weight of an iron to a timber built steam ship of 1500 tons would be, including stores and rigging, as 700 to 1000, or in the ratio of 7 to 10, being a diminution of one-third of the weight, exclusive of the superior strength and durability of the vessel.

Is that calculation made from any experience which you have had?

Yes. I am not capable myself of calculating the weight of a wooden vessel, but I have received that from such authorities as I can depend upon. I know quite accurately, to a ton, what would be the weight of a vessel of iron; and I make the proportion as 7 to 10, and then with her engines and water in the boilers, the proportion will be as 4 to 5, or a saving of about one-fifth; and then, when she is fully loaded with goods, passengers, and 800 tons of coal on board, the proportion would be reduced to one-eighth, or as 2260 is 2560 tons.

Mr. *Thurburn.*] What would be the difference in the displacement?

Nearly two feet; there is an absolute saving in the hull of the vessel in weight of 300 tons, and that is a constant saving which would be always the same, whether she was loaded or not.

Chairman.] Would not that make a greater difference than two feet in the displacement?

I think not, when loaded.

Mr. *Auber.*] When you have got everything on board, with passengers and cargo and all, does it only make one-eighth difference?

Only one-eighth difference in the weight of the whole. Then it must be borne in mind that in addition to the advantages of saving of weight, there will be a great saving of space. I have computed that, and I find that we shall save at least nine inches round the sides. We shall increase the capacity of the vessel nine inches all round, and we shall also increase the depth in the same proportion; and at that computation we gain 11,448 cubic feet in stowage.

Chairman.] How many tons would that give capacity for?

I believe 286 tons, which gives great facilities for carrying cargoes, and would enable this iron vessel of 1500 tons to take nearly 300 tons more goods upon the same draught of water as a wooden vessel built to the same model.

Does your experience tell you that an iron vessel makes more way through the water than a wooden vessel, with the same power upon her?

Yes; in every instance we have greater speed with an iron boat than with a wooden, and arising particularly from the circumstance that the first section of displacement is much less, consequently a less power is required to propel the vessel.

If you were to build an iron vessel of 1500 tons, what thickness of plate would you use?

I have computed that also. The thickness of the plates for the keel would be five-eighths, half-inch for the bottom and bilge, seven-sixteenths for the sides up the water-line, and three-eighths from that point up to the level of the deck. I have also made enquiries with reference to the size of the plates, and I find we can get them rolled perfectly sound and good at 2 feet wide, and about 7 feet long for the wide plates, and a considerable proportion would be 18 inches in width, and then we would get them as long as 12 feet.

As you diminish in breadth you increase in length?

Yes; we find the vessel much stronger by having them narrow than wide, and in a vessel of that magnitude I should also propose that she be rivetted all flush joints, and counter-sunk rivets. Those are to be rivetted firmly to angle irons 2 feet asunder. Then would come the question of staying the vessel, that is the bulk-heads, and diagonal trusses, with plates at heads and heels.

Do you propose to have bulk-heads?

Yes.

You propose to make the vessel in several compartments?

Mr. W Fairbairn.

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Yes; and I would propose to carry all the angle irons up double; and stronger gunnel iron in the engine-room, than in other parts of the vessel, on account of the action and vibration produced by the machinery. And again, I would propose that the bottom of the vessel should be strengthened with three strong water-tight bulk heads, or more; and three others with framed openings to go through all the way from the bottom to the deck.

Would you have them in equal divisions?

As equal as you can have them to divide into cabins and engine-room, and so on. And again, I would propose six others, forming cross stays as high as the lower deck, with openings; and those openings should communicate with the hold, so that you could stow the cargo, or remove it; and I should propose that a small railway, with a truck carrying goods, should run right along, for the purpose of carrying goods in and out. Upon that principle, I think the vessel would be found infinitely stronger than any timber-built vessel whatever.

Mr. *Larkins.*] Have you formed any estimate of the expence of building an iron vessel of that class?

I have. I compute that a vessel completely equipped with all her rigging, stores, and neatly-fitted cabins, and 500 horse-power, would cost about 60,000*l.*

With engines and sails, and all complete, ready for service?

Yes.

And all her cabin fittings?

Yes. I am supposing that she is neatly fitted.

Major *Turner.*] Out of the 60,000*l.* how much do you compute for the engines?

21,500*l.* I will state the particulars; for the hull, 16,500*l.*

Mr. *Thurburn.*] That is the iron part, and bulk heads?

Yes. The decks, rigging, anchors, cables, and cabins, and so on, I have taken at 20,000*l.*; the Steam-engines and boilers at 21,500*l.*; and I have added for contingencies 2,000*l.*

Major *Turner.*] Would the boilers be iron or copper?

Iron boilers.

Chairman.] How long do you think the iron boilers would last?

I believe the life of an iron boiler is about four years.

How long would a copper boiler last?

Probably about six.

Not more?

I think not more; it depends upon circumstances.

Which do you think is the cheapest in the end?

I should conceive that an iron boiler would be cheaper, even if it is renewed at the end of four years.

If you were going to fit a vessel to remain in the East Indies, which would you fit her with?

I should be disposed to try iron.

How would you have it replaced, in case of accident?

Send them out from here; you would require workshops for repairs, at the stations.

What boilers are used by the East India Company for the Ganges boats?

I do not know. Maudslay makes the engines for those.

Do you make engines?

Yes.

Did you make the engines for the Neoka?

Yes.

What boilers were they?

Iron.

Mr. *Small.*] When you said that you would recommend iron boilers in India in preference to copper, are you aware that old copper would sell for within five per cent of the cost of new in India?

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No; I was not aware of that. That would alter my opinion.

Chairman.] What would be the difference in the expence of an iron boiler and a copper boiler of the same dimensions?

The copper would be fully treble.

Mr. *Thurburn.*] What thickness of plate would you recommend?

From three-eighths to seven-sixteenths, and in some parts half an inch.

Major *Turner.*] In case of old copper selling for so much, you said you would prefer copper boilers?

In the event of old copper selling so high; only it must be remembered that the weight will be much decreased by their being worn away.

Mr. *Thurburn.*] Is not copper less liable to be injured by the action of the salt-water, than iron?

Yes; where an incrustation takes place it is apt to injure any vessel, when there is an intense heat on one side, and that of boiling water upon the other.

From what you have heard of Hall's Condensers, would you recommend them?

I think they are very good for Steam-boats; I am not partial to complexity of machinery; nor do I think that the vacuum is quite so perfect by cooling the outer surfaces, as by coming at once into contact with the injection of the steam; but I think there is a great saving in the boilers—they are very complicated.

And, therefore, there might be a difficulty in having them in the East?

Yes.

Mr. *Auber.*] On account of the difficulty of getting them repaired?

Yes; in the event of accidents; there is an immense number of tubes.

Major *Oliphant.*] Suppose by any accident a hole were knocked in the bottom of an iron steamer, does it occur to you that it could be remedied, or must she go to the bottom?

I think there is no difficulty in stopping it, if you find out where the hole takes place; all the ribs of the vessel might be so prepared that you might have it cross-barred and stopped up with timber and oakum, or any thing else, with much greater facility than in the case of a timber-built vessel. There is another advantage, which is this—that if a hole was knocked in, if she was upon a rock with a heavy sea, she would either bulge the plate in, and put it out of shape, or she would tear the plate; but she would not splinter nor start the joints: there is no danger of her going to pieces.

Chairman.] The injury would be merely local?

It would be quite local.

With respect to the plates, what thickness would you give?

Five-eighths; and half an inch below, and three-eighths up the side.

Do you think that with that thickness, the iron would lose its elasticity so much as to make it brittle?

No; I am quite confident it would not. I am engaged in a series of experiments upon that subject now, which I expect will prove that the iron is infinitely stronger than timber.

Are you apprehensive of corrosion or oxidation at all?

No; my experience goes to prove that there is no corrosion when the result is in action; whether it arise from the vibration of the parts which I think it does, in some measure; as in a railway; if you take the bars of a railway and allow them to remain one single month without the carriages running upon them, a rapid oxidation takes place. But if you keep them in use, there is no appearance of corrosion on any part of them. I had a vessel upon the Firth of Forth, composed of plates one-eighth inch thick, that has been now seven years employed; and the plates are as good as the first time that she was set to work.

Supposing she lay by for a month?

She would corrode—a very rapid corrosion would take place in dock; but not so much in running water.

Supposing the iron was galvanized, would that prevent the corrosion?

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It might to a certain extent; but I am satisfied that if you keep the vessels in action, you will have no corrosion.

But a vessel cannot always be in action?

It will not corrode below the water. All that is necessary is, above the water line to keep her painted. The old paint and blisters to be carefully scraped off before the new paint is laid on. She will not corrode at the water line, unless the plates are exposed with no paint upon them; but if you keep them properly painted, and prevent the action of the atmosphere, there will be no corrosion.

Will there be no corrosion at the joints?

None whatever.

None at the rivets?

The rivets are so tight that the metals are incorporated, or nearly so.

Would there not be a little sweating in the vessel, and would not that produce corrosion?

No; there is always a little bilge-water which keeps her nice.

Would there be any bilge-water in an iron vessel?

There is always a little from the engines, which does no harm but good.

Captain *Nairne.*] May not you have a leak from a rivet?

I should think not, if the rivet is properly put in.

Are there not constant complaints in ships of the tanks?

It must arise from their being badly made. Even good boilers when well made leak frequently, from the expansion and contraction of the metals, from their standing cold at one time and being very intensely forced with fire at another. That is an effect upon the metal, which I think would not take place in the shell of a ship.

Chairman.] Would there not be considerable heat in the centre of the vessel where the engines are?

Yes; but there is always the passage of air which would keep the temperature down. You have the temperature of the sea on one side, and you have the temperature of the air outside of the boilers in the interior. Then if there are any bad rivets, they show themselves when the vessel is at first afloat, and ought to be taken out and replaced with good ones. If leakage takes place at all, it is from defective workmanship.

Mr. *Auber.*] Are we to understand that in no part it is liable to corrosion, supposing she is lying by for nineteen days, if she has been painted above the water-line: you say that that would prevent it there, and that underneath there is no liability at all?

No; because the atmosphere cannot get at it.

Then there is a possibility of preventing corrosion entirely?

Yes, with care.

Mr. *Larkins.*] Are there any iron steamers in her Majesty's service?

I am not aware of any.

What would be the effect of an eighteen-pound shot striking the side of an iron vessel?

I think it is the best description of vessel for war, from the circumstance that numbers of men are maimed and killed from splinters of timber. In this case the ball would go right through and clear all before it.

Would there not be great difficulty in stopping a leak under those circumstances?

I think not.

Would it not make a larger hole in an iron side than in a wooden one?

No. I am of a totally different opinion: I think it would give a much smaller hole.

Mr. *Auber.*] Can you state to what draught the vessel would be brought down with only the engines on board, without any coals, or passengers, or cargo?

I could not give a correct answer to that question.

Captain *Nairne.*] With reference to the expansion you spoke off, from heat and cold in iron, would you apprehend any danger from that in the vessel in a hot climate?

No.

Would you apprehend that the rivets might be affected in that way?

No; the difference of temperature would be so trifling, that it would never affect the rivets. In the whole mass of the vessel I admit that she would be longer and more bulky in the ratio of the temperature. But she is so elastic in herself, being all composed of malleable iron, that it would never affect any single part in the construction. It would enlarge and contract exactly in the ratio of the different degrees of temperature.

Mr. *Thurburn.*] In laying down railroads, must not a separate allowance be made for the contraction and expansion?

Yes; and in the case of the Southwark Bridge, I think it is always higher in summer than in winter. Our vessel would be the same; her sides would be a little enlarged each way, but it is so trifling that it would not produce any effect.

Mr. *Auber.*] You have stated that if iron railroads were left untraversed for a short time they would easily corrode. Then, with reference to a vessel, if she is not brought to her draught of water, what would you do to prevent corrosion within the period when she had only the engines on board, and the period when she was fully laden?

I would put on two coats of oil paint. I would paint as low as I could get.

Major *Turner.*] In a vessel of 1,500 tons, to be used on the Indian side, how many cabins do you think you could have, giving not less than seven feet by eight to each cabin?

I do not know. I could soon ascertain that.

Chairman.] With respect to a 1,500 ton vessel with 500 horse power, what would be the mean speed of her under ordinary circumstances?

I think she would average twelve miles an hour; in smooth water she would go at least thirteen miles.

Would a wooden vessel of the same power go so quick?

I think not.

Mr. *Larkins.*] If she would only go thirteen miles an hour, is not twelve rather a high average?

Yes; I am taking it in moderate weather. Upon the whole voyage from London to Alexandria she probably would not do more than eleven upon the average.

Chairman.] What would she do with a strong head wind?

From eight to nine knots an hour.

With all her power on?

Not if it was blowing very hard; it is difficult to tell.

What quantity of coal per horse-power per hour do you calculate?

From eight to nine pounds per horse-power per hour.

Of the best Newcastle coal?

Of the best coal. I should recommend the engines to work expansively, because I think there is a great saving by that means. I am not sure that it might not be brought down to six or seven pounds an hour. I worked on the expansive system, with engines upon a large scale, made at my works in Manchester, and we effected a very considerable saving working the steam up to a certain point, and then cutting off pretty early in the stroke, and expanding out and condensing the usual way, we found a great saving.

What would be the size of the boiler?

I have not made that calculation

What would you recommend?

I should prefer the circular boiler.

If you used the circular boiler, what would be the size of that?

About thirty-two or thirty-three feet long.

Mr. *Thurburn.*] Do you consider that seven or eight pounds would be the average consumption of coal?

I would rather say eight.

Mr. W. Fairbairn.

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Mr. *Auber*.] What would be the diameter of the cylinder?
Seventy-eight inches.

And the length of the stroke?
Seven feet.

Chairman.] What sized wheel would you have?
About thirty feet.

What would be the dip of the wheel?
She would vary; I would put on the divided floats in that case, and we would give great facility for altering them according to the immersion.

Mr. *Thurburn*.] I find, if my calculation is correct, that 800 tons of coal, at a consumption of eight pounds per horse-power, gives about sixteen days and two-thirds consumption?
I dare say that is correct.

Mr. *Larkins*.] Are you prepared to say what would be the expense of a wooden steamer of the same tonnage?
No; I have no practice in that. If it is the wish of the Committee, I would send up our ship-builder, who would give information upon that subject.

Major *Oliphant*.] Do you propose that this iron vessel should be available for sailing as well as steaming?
Certainly: she would be rigged also.

Captain *Barber*.] You said that the length of accommodation for passengers abaft would be seventy feet: might not the cabins come to the engine-room, instead of leaving a well, as you proposed, for the cargo?
You would require a hatchway, and you would require ten or twelve feet for coal; you might bring the cabins forward on each side right up to the engine-room, the small cabins might be introduced there.

You would have a space right up to the engine-room?
Yes; there would be two decks.

What height would there be between the first deck and the lower deck?
With a poop-deck three feet high, that would give the hold ten feet; and then about eight feet and nine feet for the after-cabins.

What height would be the floor of the first cabins from the water's edge?
About four feet: you may have excellent ventillation in any part of the ship by putting a fan in the engine-room.

Mr. *Auber*.] Would these vessels be available for the purpose of war, in case of a war breaking out?
Certainly; they are infinitely stronger than timber; there is no question of that.

You would not be afraid of giving them two 68-pounders?
Not at all; you would have to make them strong.

Captain *Barber*.] What do you think would be the durability of an iron vessel of this kind?
I really cannot say. I only tell you, that I have constructed in Manchester a great number of water-wheels, entirely of iron, and we have had them twenty years at work, and they are just as good now as when put up, and are likely to be so fifty years hence: and they are more exposed to wet and dry than a vessel would be; they appear not to be any worse for seven or eight years' wear; I think it would last for 100 years, if properly taken care of.

Major *Oliphant*.] Do you not apprehend that some danger would be to be apprehended from the vibration being so great in the case of any accident happening?
I think not; the greatest danger, if there is any danger at all, would be the rolling in a sea; and if you compare the strength of an iron vessel, all en masse, with no joints whatever, to that of a timber one, when the planks are laid edge to edge, and not secured to each other, I think you will see that it is almost impossible that she can give way without tearing the plates asunder; for the joints are as strong, or rather stronger than the solid plate.

Mr. W. Fairbairn.

12th Nov. 1838.

Major *Turner*.] You consider the 500 horse power to be the best relative proportion to the tonnage of 1500?

I think so.

Captain *Barber*.] Do you think it would be possible to propel her faster with 550 horse power than with 500?

I am inclined to think that you would get very little, if any more speed: to the best of my judgment, that proportion would be good.

Mr. *Auber*.] Upon what flooring are the engines placed?

They would be placed either upon hard English oak, or upon teak-wood, bolted to the cross frames; but I prefer them upon angle iron entirely, from the circumstance that it is much stronger; only the oak is convenient for fitting the engines on. I am not sure whether timber at all should be used. I am inclined to think that I should fix them upon iron kelsons.

Captain *Barber*.] Have you made any calculation of the difference of expense between the repair of an iron boat and of a wooden boat, per annum?

I have not.

What would be a fair per-centage to take per annum for the repair of an iron boat?

I should conceive that three per cent would be quite sufficient upon the shell of the boat, including the painting.

Chairman.] You say an iron boiler would probably last four years, and the boat you think would last seven or eight years without repair?

I think the boat would last fifty years, with care: we have no repair upon our boats.

How many boats would be required to do the service between here and Alexandria, for a monthly dispatch from each place, having thirteen days steaming and seventeen days idle each month?

It would require three vessels; because you might want repairs to the machinery, or you might want boilers. You must have a spare vessel.

Mr. *Larkins*.] Supposing you received an order to construct an iron steamer of 1500 tons, in what time could you complete her?

In about eighteen months. It would take two years if we were to construct the engines and all: we could build the vessel in eighteen months.

Chairman.] What iron would you construct her of?—British iron?

Yes, Colebrook Dale or Butterly. We have hitherto used Colebrook Dale chiefly.

Is the British iron as tough as the foreign iron?

Yes; the British iron is very good. It is very much improved of late years.

Mr. *Thurburn*.] From your experience, is the insurance upon iron steamboats equally low as upon wooden vessels?

Yes; it is the same.

There is no difficulty in effecting insurance upon them?

No; we have found no difficulty.

Mr. *Auber*.] With reference to wood coming in contact with the iron, you say that you would prefer oak, only so far as the engines being bedded on it. How would the engines be placed with reference to the two decks?

The decks would be nearly dry in the inside. It would not affect the iron but where it is alternately wet and dry; then the acidity of the wood is objectionable, and it has a tendency to corrode the iron.

Chairman.] Is there any particular wood you would recommend under those circumstances?

Yes, the African teak wood.

Is not the teak wood very heavy?

It is.

Would you have oak decks?

No; I should prefer Dantzic fir decks.

Mr. *Pelly*.] What would you calculate the expansion of a vessel 220 feet in length with the thermometer at 80°?

It would probably be about the twentieth part of an inch in ten feet.

Mr. W. Fairbairn.

12th Nov. 1838.

Chairman.] But although the temperature would be 80° externally, the temperature internally would be much greater, particularly near the engines: would that have any effect?

No; I can give you data:—At 212, boiling water, iron expands about one tenth of an inch in ten feet; it will not be one inch in the whole length. With regard to the comparative safety of wood and of iron, I know an instance of an iron vessel in the Humber coming in contact with a large stone. She got aground upon a large stone: the effect was that she dinged in her bottom perhaps six inches; and all that we did was to put a fire under her, and got a screw-jack, and pushed her out again.

Chairman.] Are you aware of there being any substitute for coal as fuel?
I have heard of some preparation.

Do you know anything of a French patent that there is?
I have heard of it, but I do not know any particulars of it.

Do you know whether it takes less room?
Less room, I understand.

Is the consumption greatly diminished?
I do not know as to the qualities of this prepared fuel.

Do you know Mr. Williams of Liverpool?
Yes.

Are you aware that he has discovered a great improvement in that respect?
I have heard of it; but I do not know anything of the nature of it.

Would it take up much less room?
Certainly it would.

(Adjourned.)

Friday, 16*th November,* 1838.

PRESENT.

Mr. Pirie, Alderman.	Mr. P. Auber.
Mr. Larkins.	Mr. Gouger.
Mr. Read.	Major Turner.
Major Oliphant.	Captain Nairne.
Mr. MacKillop.	

T. A. CURTIS, Esq., in the Chair.

16th Nov. 1838.

Captain *Barber* delivered in plans and drawings of vessels, of 1500, 1250, 1000, and 750 tons, showing the number of passengers they would accommodate, giving to every passenger a cabin, and stating that he had contemplated doubling of persons in the low-priced cabins, to enable a vessel of 1500 tons to carry 100, as estimated in his original calculations; those exhibited are in conformity with the comparative estimates delivered in last.

(Adjourned.)

Monday, 19*th November*, 1838.

PRESENT.

Mr. Read.	Mr. Gouger.
Major Oliphant.	Mr. Small.
Mr. Stewart.	Captain Nairne.
Mr. Larkins.	Mr. MacKillop.
Mr. Auber.	Mr. R. Thurburn.

T. A. CURTIS, Esq., in the Chair.

Mr. McGREGOR LAIRD was examined as follows:

Mr. McGregor Laird.

19*th Nov.* 1838.

Chairman.] You are acquainted with steam navigation?
I am.

You are not either a ship builder or an engineer?
No.

You are merely acquainted with the facts of steam navigation?
Yes.

Have you been yourself much in steam-boats?
A good deal.

And you have paid great attention to the management of them?
Yes.

And to the speed of them?
Yes; to the average speed particularly.

And to the management of the machinery?
Yes.

Where have you been principally by steam-boats?
Principally in St. George's Channel; and I have been abroad; I was as far as the coast of Africa in company with an iron steamer.

What was her tonnage?
She was very small, only 55 tons; she was the first iron sea-steamer that was built.

Did she go out herself or was she towed out?
She steamed and sailed out.

Were you aboard of her?
No; I was aboard another vessel, a wooden vessel of 120 tons; should not say I have built no vessels, for I built that iron vessel; I was in business at the time in Liverpool.

You did not build the wooden vessel?
No; my brother built the wooden vessel; he is the principal iron steamboat builder in the kingdom.

What should you say is the average speed of a steamer?
It depends upon the size, power, and displacement.

What should you say for a vessel of 1500 tons and 500 horse-power?
She ought to average 200 or 220 nautical miles per 24 hours.

What would be the consumption of fuel?
A vessel of 500 horse-power would consume about 34 to 35 tons a-day. The larger engines are more economical than the smaller ones; they work with less friction.

Should you think that 500 horse-power would be sufficient for a vessel of 1500 tons?
I should say rather too much, if it was only intended for passengers.

'r. McGregor Laird.

th Nov. 1838.

Would it not be well to have an excess of power?

If you can afford it.

Would it be a great advantage to the boat?

It may be overdone, depending upon the nature of the service. There is a case in point; now there is the Liverpool, a vessel of 1050 tons or 1100 tons, she has a 75 inch cylinder and 7 feet stroke, about 460 horse-power. I think that vessel would go much faster if she had 100 horse-power less.—She put back the other day upon a voyage to New York.

Do you think if she had 360 horse-power instead of 460, that she would be a better boat?

I think that her average voyages would be better.

Do you know what her draught of water was?

She drew when first she left Liverpool 17 feet, including her cargo and passengers.

Do you know what she draws without her passengers and cargo?

With her engines in, she draws about 13 feet.

Have you any calculations what she would draw, supposing, instead of being made of wood she was made of iron?

Yes; I am resident director of the British American Company; we are going to build an iron vessel of nearly the same size as the Liverpool, or about perhaps 100 tons larger, and we expect that she will go upon an average draught of water of 11 feet, that is to say, that her starting draught will be about twelve feet, and at her arrival at New York about 10, making a difference of two feet between the arrival and departure.

So you put it down as an average draught of 11 feet?

Yes.

When she has got all her coals and cargo in, and her engines, what would she draw?

About 12 feet.

Then what would be the difference between her and the Liverpool?

A difference of five feet; the Liverpool drew about 17 feet; an iron vessel for that voyage to New York would draw about 12 feet, with all her coals and cargo, and passengers on board, so that it would be the difference between 12 feet and 17 feet.

What do you think would be the weight of a wooden steamer of 1500 tons and 500 horse-power with her engines in?

The weight of the hull would be about 1000 tons, and the weight of the engines 500 tons; she would weigh about her own tonnage.

What would she weigh if she was made of iron?

The hull of the vessel would be about 400 or 500 tons lighter, that is to say, the hull of the wooden would weigh about 1000 tons, and the other would weigh about 500 or 600.

How many miles should you think that a steam vessel might fairly be calculated to go in the course of a year, taking 3000 mile trips?

It depends a great deal upon the station, the size and power of the vessel. If they are upon a station where they can be easily kept in order, such as between Liverpool and New York, you may fairly calculate they will do from 30,000 to 36,000 miles a-year.

But supposing they were to go to a place where there was not the same facility of overhauling, what should you say?

I think 24,000 miles a-year would be as much as you could calculate upon, and that you would only do it with very perfect vessels, machinery, and very large vessels. The average of the Admiralty packets is about 15,000 miles a year, but they are no guide. In 1834 I procured the averages of the great majority of the steamers in this country, and I found very few of them steamed more than 3000 hours per annum, which at the average rate of eight miles an hour, would be about 24,000 miles a-year.

Do you think that information would be gained from the experience of the General Steam Navigation Company?

I do not think that the General Steam Navigation Company would be good parties to refer to; they have a very indifferent class of boats as to power of engines, and the trips are short; but if you take the common trading steamers between London and Dublin, or between London and Cork, you will find that there are very few vessels that are actually at work more than 3000 hours per annum; I should say the average would be below that.

Do you think that is in consequence of the necessity of overhauling the machinery so often?

There is the overhauling of the machinery and repairs to boilers and lying in port. If you take the voyage as between London and New York, I have no doubt you may calculate that the vessel may be at sea one half of her time, that is to say, she may be at sea 15 days out of each month, because the run is then continuous, and she has not to come into port and go out of port again, which creates delay principally, and loss of time.

What should you think of a vessel going to Alexandria, for instance?

A large vessel going from this country to Alexandria, ought to do from 36 to 40,000 miles per annum; any vessel above 800 or 900 tons ought to do that if she has first-rate machinery.

What should you think a prudent time to allow for overhauling those vessels, and how often would you overhaul them?

A good steam vessel ought to run between three and four years without any serious overhauling.

Would you, if you were to send forward a new steamer, allow her to go three voyages without having her overhauled?

I should be very sorry if she did not go twelve months without having her overhauled. As to overhauling, if she wants anything, of course it is necessary to repair her immediately; but if you mean by overhauling, bringing her up to London and putting her in dock, I would not think it necessary. You ought to have a superior engineer, and pay him handsomely; and the vessel ought to run three years without any heavy repairs that would require 24 hours to make.

Suppose you were to undertake a steam navigation between this and Alexandria, and to have to do it monthly, how many boats would you have?

Three.

Do not you think that two would do the service?

Two would do the service; but if any accident happened to one, you would be without a boat.

Therefore you would have three?

Certainly: the distance to Alexandria is, as nearly as possible, 2900 miles from Falmouth; and if you make twelve voyages there and back, it would be 70,000 miles a-year. If you had only two vessels, I have no doubt they would do the work; but if any accident happened, if one got ashore, broke a beam, or met with any serious accident, you would be without a vessel; and therefore, I do not think you could safely undertake with the Government to do that line monthly, without three vessels.

Would it alter your opinion if there was to be a duplicate set of machinery at each end?

I do not think it would alter my opinion, because that would not do away with the risk of an accident to the vessel; but as to accidents to the machinery, I have no doubt that with first-rate engines to begin with, and proper care afterwards, two vessels could do the work; but it is exceedingly difficult to get that care exercised.

Therefore, according to your own experience, and seeing the difficulty of getting proper care exercised, you would recommend three boats?

Decidedly; we have a case nearly in point. At present there is a tender out for the Halifax mail, which we are thinking of doing something with, but we would not undertake to have a vessel to make a monthly voyage to and from Halifax, which is a shorter distance than to Alexandria, without having three vessels in it.

What is the distance to Halifax?

It is about 2,400 miles from Falmouth to Halifax.

Mr. McGregor Laird.

19th Nov. 1838.

What accommodation do you think there would be in a 1,500 ton vessel giving cabins of seven feet by ten?

I am afraid you would not accommodate many passengers in a steamer in that way. Supposing you had a steamer of 1,500 tons, I suppose that would make it about 225 between the perpendiculars; out of that you would have to take from 80 to 90 feet for the engine-room, that would leave you about 140 feet for your cabin-deck; now, if you divide that by seven feet and by ten, you will not get a great number of single state-rooms upon the cabin deck; I should say certainly not more than fifty, and only that number upon one deck, by placing the saloon or the dining-room upon the upper deck.

Do you calculate the forecastle?

No; I take the forecastle for the crew: I carry the cabins right forward under the forecastle; I have a case in point just now. In the "President" we are building, a vessel of about 1,800 tons; she is a pooped vessel, and I find it exceedingly difficult to get the room.

How many passengers do you propose to take in her?

One hundred and twenty in the after-cabin, and about the same number in the fore-cabin; 240 altogether. Here we have two beds in a state-room, so that we have about sixty state-rooms in the after-part of the vessel, not upon one deck, but upon the poop-deck also; the poop is 84 feet long, and with all this space, I am afraid I shall have to reduce the number of state-rooms to 54 or 55.

How many passengers do you calculate that a steamer of 1,500 tons, with the sized cabins mentioned in the former question, would carry?

I should think a steamer of that size from 50 to 60 in single state-rooms seven feet by ten feet.

Captain *Barber.*] Upon one deck?

Yes, upon one deck.

Chairman.] If there was lower accommodation, would that double the quantity?

I am afraid you would not get passengers to go in it, for we have the greatest difficulty in the American trade to do it. The "British Queen" is a flush-decked ship, and she has a lower cabin-deck lighted with scuttles, it is very light and airy; but the passengers object to it, and the consequence is, that I am making the "President" a pooped vessel, though I much prefer a flush-deck for so large a steamer.

Mr. *Larkins.*] Speaking of the Liverpool, you said that you thought she would have greater speed with less power; did you say that with reference generally to the relative proportions of the tonnage and the horse-power, or with reference to the peculiar build of the Liverpool?

I mentioned it, because I think the Liverpool is a vessel which shows the possibility of over-powering a vessel of a certain burthen; she is narrow and long—217 feet between the perpendiculars, and only 31 feet beam; the consequence of her having these powerful engines is, that the paddle shaft is thrown considerably above deck; the paddle boxes, consequently, are above 22 feet high; the weight of the engines about 500 tons. If an engine of 360 horse-power, weighing about 350 or 60 tons, with a six feet stroke, was put into that vessel, and her shaft in consequence got under deck, she would go to sea, including the less quantity of coals she would require, three feet lighter, and her average results would be better. I do not mean to say that when she is perfectly light, she would not go faster with her present power; but when she is with her coals for a run of 3,000 miles, so deeply immersed as 17 feet, I do say she would be a safer and more comfortable vessel, and make a better passage *on the average*, if she only had 360 horse-power, and carried her engines and fuel on 14 feet.

Captain *Barber.*] If you were to reduce her length, and increase her beam, would your opinion as to her power be altered?

No; if you reduce the length, and increase the beam, I think you would get a very uncomfortable vessel. I do not like her proportions; but I am sure if she were reduced in length, and still had the same power in her, she would be a worse vessel than she is now.

Chairman.] What breadth of beam would you recommend for a 1,500 ton vessel for passengers?

A vessel of 1,500 tons I would make about 240 feet long, by 36 feet beam, if for passengers only.

Would there be any difference in the beam, in your opinion, whether she was iron or wood?

I would not recommend an iron vessel of 240 feet long.

And you would not recommend a vessel of 1,500 tons?

No; I would not upon this principle—my brother and myself have built the greatest number of iron vessels in the kingdom; at present the largest we have built is the Rainbow; she is 190 feet long; she has answered exceedingly well; but I would not like to jump up 50 feet upon her length at once. I would be glad to build a vessel 25 feet longer than the Rainbow; it is what we intend doing ourselves.

What would be your apprehension of increasing the length?

That we have not had sufficient experience of iron to know exactly the way in which the straining in a long vessel of that sort, affects it; that when you get to that immense size, the vessel being all malleable iron-work, it would be very difficult to handle the different parts; and if there is any mistake made, it would be fatal to iron-boats for some time. I would not like to take the risk.

Would not there be an increase of the thickness of the plates proportioned to the size of the vessel?

That increase is just what I am afraid of; the difficulty of working and handling them, would be so great; an iron boat is composed of small portions rivetted together; and when you get to heavy plates, they are difficult to handle. I should have no objection to build an iron vessel of 12 or 1,300 tons, but not 240 feet long.

What would be the length of a vessel of 1,300 tons?

The vessel we proposed to build, is 220 feet long, and 36 feet beam.

Do you think there would be all the increased risk, with an increase of 20 feet upon that?

Yes; I think that it is a bold stroke to lay down one now of 220 feet long, considering that she is 30 feet longer than any that has been built yet.

Did not the same apprehension exist with respect to the length of a vessel like the Rainbow, before she was built?

She was built entirely for river navigation, to run between London and Ramsgate; if she had been built for a sea-going vessel, or if we had had any idea that the General Steam Navigation Company would have placed her upon a sea station, she would have been a very different vessel.

What is the thickness of the plates?

Three-eighths at bottom.

What is the thickness near the keel?

I think the keel is half an inch.

Putting aside your apprehension as to the length of the vessel, what would you recommend as the thickness of iron plates for a 1,500 ton vessel?

They ought to be at least three quarter inch from the bottom, and to be double rivetted.

Have you seen the new system of rivetting of Mr. Fairbairn?

I have not seen it in operation. I have seen the machinery.

Have you never seen any specimen of the rivets that has been so done?

No; I never have. I do not think it is applicable to a boat; you could not bring the boat to it: the machine is a fixed machine; you have to take the boiler to the machine—now it would be impossible to bring a boat of 1,500 tons to the machine.

Could not they take the machine to the boat?

I am afraid not.

Is it worked by steam?

Yes; it is a very ingenious thing; but I think it is only applicable to one particular description of boilers. I do not think they could make a

Mr. McGregor Laird.

marine boiler with it; but I have never seen it in operation, and therefore I cannot say.

19th Nov. 1838.

Captain *Barber.*] Supposing you had to build a steamer 225 feet in length, would you prefer building it of wood or of iron?

It would depend upon whether the vessel was for myself, or for other people that I was connected with. For myself, I would take the risk, and build her of iron; but for others I would not. I took the risk of the first one; and, of course, the Rainbow was a risk in some measure; but they were built for very different work from that of crossing regularly the Bay of Biscay, or going against the South-west Monsoon.

Chairman.] Was the Rainbow built entirely at your suggestion?

No; the Rainbow was built under contract with the General Steam Navigation Company.

Where was she built?

At Liverpool, by my brother, Mr. John Laird.

Was it your suggestion that she should be built of that length?

It was my brother's model; she is 190 feet between the perpendiculars, and 25 feet beam, and draws five feet water.

You have no apprehension about this vessel of 1,300 tons, and with 36 feet beam, that you are going to build?

None whatever.

What will be her draught of water?

When going to sea with her cargo and fuel on board, her draught of water will be 12 feet.

Mr. *Read.*] Do you propose to build her with compartments?

Yes; the Rainbow has seven bulk-heads.

How many would you propose in this vessel?

From seven to ten—we shall put them wherever we can get them; for we consider them a great cause of safety in that description of vessel.

Chairman.] How would you contrive with respect to engine-room?

In the Rainbow the engine-room is about 40 feet long. Between the engine and the boiler there is an iron bulk-head, with an aperture through it like an archway about seven feet deep, so as to allow the firemen to go from the engine-room into the boiler; we find that of great service in her—there is not the least tremulous motion in the vessel.

That would hardly act as a bulk head?

The great secret of building an iron boat, is to keep the iron as much edgeways as possible. As long as you can keep iron edgeways, you have strength, and it is almost impossible to bend it; those bulk-heads are to prevent the bottom springing up, and to isolate the holds, cabins, and engine-room from each other, so that a leak in one would not affect the other part of the vessel.

Has the Rainbow strained in any way whatever during these heavy gales of wind?

I am informed not at all.

Did she make no water at all during that time?

So they informed me, when I was on board the other day. As a proof that she does not strain, the people on board assured me that there is not the slightest creaking in the joiner's work of the cabin, which is a sure sign that there is no working of the vessel's frame or sides; and, in fact, if an iron vessel once works, it is all over with her; she will break in two: the only thing is to keep her perfectly stiff and immovable.

Mr. *Larkins.*] Is there any tremulous motion in an iron vessel?

None in the Rainbow.

Captain *Barber.*] Do you conceive that the machinery would last longer in an iron vessel, than in a wooden?

I do not see why it should.

Do you think that if a wooden vessel works, that that working of the wooden vessel is a counteraction of the working of the machinery, and must cause great friction?

I have known very weak vessels have their machinery in a long time, that had a good foundation-plate. I do not mean to say that a weak vessel is a good thing to put the machinery in.

Chairman.] You said that there was no tremulous motion in the Rainbow; does that arise from her engine being placed in any particular way?

I do not know whether it is that, because in other boats we have built there is no tremulous motion. The Rainbow has an upright engine, what we call a steeple engine; it was made in that way on account of its lightness, and the vessel being intended for the river, a light draft of water was required; but we built another for Mr. Assheton Smith very lately, which, if any thing, has less motion than the Rainbow; you cannot feel her engines moving, and they are beam engines, of a very different make.

Is that an iron boat?

It is.

What is your opinion about corrosion?

I do not think there is any corrosion in iron vessels; we have never found any corrosion in an iron boat as long as you keep them moving. It is extraordinary, and I believe that some law may be found out to account for that, but at present we have never seen the slightest appearance of decay or corrosion in any of the iron boats we have built.

How is it just above the water's edge?

It is equally good there.

Are not you obliged to keep it constantly painted over?

They do not get painted any more than a common ship gets painted; an instance happened a twelvemonth ago: a vessel called the Garry Owen, that my brother built about four years since, to run between Limerick and Kilrush, at the mouth of the Shannon; that vessel carries deck-loads of cattle—pigs chiefly. She is a vessel of about 300 tons, and her boilers were taken out about a twelvemonth ago perfectly rotten, like brown paper, and the bottom of the iron vessel immediately below the boiler was as sound as the day it came out of the manufacturer's hands, both inside and out. I fancy that it is to be accounted for upon the same principle as the fact that the iron rails upon railways, as long as the carriages run upon them do not decay at all, at least the oxidation is scarcely perceptible, but if you take the carriages off them, or if you put a rail of similar dimensions upon the ground alongside of it, the rail that is not run upon decays very fast.

Is there no symptom of oxidation in the joining of the iron work?

No.

Nor under the rivets?

No; the rivetting is much stronger than the plate itself.

Mr *Thurburn*.] Then to prevent that taking place, you would require to keep the vessel constantly in motion?

If you lay an iron vessel up in still water she will decay, but not in running water.

Mr. *Auber*.] If she is painted would she decay?

She would decay just like a bar of iron does, if it is laid upon the ground; the paint scales off from the oxidation going on below it; but if you keep it in motion it will not decay. It is a curious subject, and I hope some of the scientific men of the day will take it up.

You have had a great deal to do with steam navigation, and you have had something to do with the East India Company. What is your opinion with regard to the best means of effecting a communication between this country and India. What stages would you propose to perform it in, and what number of vessels would you have of 1200 or 1500 tons?

Supposing you determined to carry out what is called a comprehensive plan to Calcutta, I think you should have a station in the Red Sea, at the island of Perim.

You would make Alexandria the first thing?

Yes; I made out a memorandum some time ago upon the question, taking the distances and the time, which, if the Committee wish, I will read over.

Mr McGregor Laird.

The same was read as follows:

19th Nov. 1838. " **Memorandum of the cost of keeping up a monthly communication by steam ships of 1300 tons burthen and 400 horse-power, to and from Falmouth and the ports of Bombay, Madras, and Calcutta.**

Distance and Time.

	Miles.	Days.
Falmouth to Alexandria, calling at Malta	2,900	14
Alexandria to Suez (by iron steam-boats to Cairo, and land conveyance to Suez)	..	5
Suez to Perim	1,250	6
Perim to Madras	2,700	13
Madras to Calcutta	800	4
Three days detention at Perim and Madras	..	3
Calcutta Mail out	7,650	45
Bombay Mail to Perim	..	25
Perim to Bombay	1,700	8
Two days at Perim	..	2
		35

Prime Cost.

	£
Three vessels between Falmouth and Alexandria, at 40,000*l.* each ..	120,000
Two vessels between Suez and Perim, at 40,000*l* each	80,000
Three vessels between Perim and Calcutta	120,000
	£320,000
Two vessels between Perim and Bombay	80,000
	£400,000
Two iron boats between Alexandria and Cairo, at 7,500*l.* each ..	15,000
	£415,000

Coal Depots.

Falmouth, Alexandria, Perim, Bombay, and Calcutta, each to hold 1,200 tons, at 4,000*l*, each	20,000
Prime Cost	435,000

Annual Expenses.

Annual charge to perpetuate the property, at 20 per cent. per annum, as per statement	87,000
Annual charge for floating establishment, as per statement, 3,515*l.* each for ten vessels	35,150

Annual Expense of Fuel.

Falmouth to Alexandria:	
Twenty-four voyages of fourteen days each, at 30 tons per diem, 10,080 tons at an average cost of 30*s.* per ton	15,120
Alexandria to Cairo	2,000
Suez to Perim:—	
Twenty-four voyages of six days each, at 30 tons per day, 4,320 tons at 3*l.* per ton	12,960
Perim to Calcutta:	
Twenty-four voyages of seventeen days each, at 30 tons per day, 12,240 tons at 3*l.* per ton	36,720
Perim to Bombay:	
Twenty-four voyages of eight days each, at 30 tons per day, 5,766 tons at 3*l.* per ton	17,280
Annual expense for engine stores, oil, tallow, &c., at 750*l.* each vessel	7,500
Establishment on board coal-hulks at the five stations, at 500*l.* each ..	2,500
Floating establishment on board iron steamers on the Nile	3,770
	£220,000

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Estimated Receipts.

Sixty passengers each way, at 100*l.* nett*	£144,000
Parcels, specie, and valuables, at 500*l.* each way	12,000
Government grant	100,000
	£256,000
Less 10 per cent. commission on 156,000*l.* passage-money and freight ..	15,600
	£240,400
Less expenses	220,000
Profit	£20,400

Upon a capital invested of 450,000*l.*

Major *Oliphant.*] You propose to make Perim one of the stations. Is Perim inhabited?

No, I have understood not.

Chairman.] Do you know any thing about the possibility of approach to Perim?

I believe there is an excellent harbour there.

Do you know what quantity of water there is?

There is abundance of water.

Is there any fresh water to take in there?

There is not; but that you can easily get from the opposite coast.

Captain *Barber.*] Do you think there would be any difference in the strain of a vessel navigating between this and New York and between this and Alexandria taking the year through?

The Alexandrian voyage is a bagatelle in comparison with that to New York. A vessel ought to last much longer going to Alexandria than going to New York.

Mr. *Auber.*] Supposing a company was going to start and to have three vessels to run to Alexandria, would you recommend the Company to have one of iron out of the three?

Certainly.

Mr. *Gouger.*] Would you rather have all three of iron?

As my own personal opinion, I think the iron are far superior both in strength, durability, and economy in working; but when I am asked to recommend others to take iron vessels exclusively, and risk the success of the scheme upon what must yet be considered an experiment, I cannot do it. I know pretty well what a wooden vessel will do from practice, but I only know from analogy what an iron boat of 1200 or 1500 tons would do; therefore I consider it premature to hinge the success of any part of this scheme upon iron vessels exclusively. It will be observed that I have proposed to have in all ten vessels. Now you may save one vessel out of those by running the vessel from Suez to Bombay throughout, and carrying the Calcutta passengers to and from Perim to Suez; but I do not think you can do with less than six vessels upon the other side and three on this, in order to ensure a monthly communication of the mails.

That would include the Bombay vessels?

Yes; I calculate that the Calcutta vessels would never go higher than Perim, because the distance from Perim to Calcutta being 3900 miles, I think that is quite work enough; and then that the Bombay vessels would carry the passengers from Perim to Suez and from Suez to Perim.

Do you take Ceylon?

The vessels would, of course, stop at Point de Galle or Trincomalee.

What price do you put the coals at between this and Alexandria?

Thirty shillings a ton.

At what price between Suez and Calcutta?

At 3*l.* a ton upon the average; that is, allowing that price to cover the depreciation which I calculate to be about 15 per cent. per annum.

Major *Oliphant.*] Do you make any calculation for the expense upon the canal?

No. I calculate that a small steamer would take the passengers from

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Alexandria to Cairo by Rosetta. We built a small iron steam-boat for the Pacha, that has made that passage frequently.

Chairman.] What do you put for wear and tear?

I allow 20 per cent. to perpetuate the property; that is 5 per cent. interest, 5 per cent. insurance, and 10 per cent. wear and tear; and I think this would only suffice for passenger vessels of large size; 25 to 30 per cent. ought to be allowed on small steamers carrying goods and passengers.

Is that amount for insurance formed upon any experience, or upon supposition?

You can insure a coasting steamer here at 6*l.* per annum; and I expect, and I am pretty sure they will do large steamers at less premium than the coasting ones. I understand that they paid eight guineas per cent. upon the Great Western, but I think that is merely because it was the first vessel, and that it will come down to 5*l.* per cent.

Major *Oliphant.*] What size do you propose to have the steamers upon the Nile?

About 125 or 120 feet long.

What cabin accommodation?

A cabin accommodation for thirty or forty passengers. I never was in Egypt; but I fancy she would make the run from Alexandria to Cairo in 36 hours: she would go by Rosetta. I should have the steam-boats to draw about three feet of water.

In 36 hours would you not require to accommodate all the passengers with berths?

I calculate upon two boats.

Mr. *Auber.*] Does your plan calculate upon ten vessels or upon nine?

Ten vessels.

Chairman.] What number of passengers do you intend to take, and what do you consider will be the income?

I consider that sixty passengers each way would be a very liberal calculation: that would be about 1,400 passengers per annum, going and coming from Egypt: I have put them down at 100*l.* net, or 144,000*l.*; and the parcels, specie, and valuables, about 500*l.* each way, 12,000*l.*; I make a total of 256,000*l.*, and then I put down Government grant, 100,000*l.*; because I feel assured you can possibly do it to make it a profitable speculation without the assistance of Government.

When you say "the Government," do you mean the East India Government?

And our own Government together. I propose to relieve the Government from the Malta mail; it would not take much time to drop the Malta mail upon the road, and you might do the Gibraltar; but they have a contract at present for that. They pay 30,000*l.* per annum now for a weekly mail to and from Gibraltar.

Major *Oliphant.*] Do you calculate anything for postages in your scheme?

No. I fancy that if the Government allow a grant, they would insist upon having that. I might state, that in my calculation of the time, I consider that it is rather understated; for there is nothing to prevent the India mail from being carried at the same average rate as the American mail is by the Great Western at present; and the average upon all her voyages is above 210 to 215 knots per day.

Mr. *Auber.*] Have you taken into consideration the monsoon?

Yes; I have thought a good deal about the south-west monsoon: I think it would make a difference of three days upon the passage from Bombay to Perim.

Chairman.] Not more?

Not more: the distance is 1,700 miles to Perim.

You allow at present eight days?

Yes; and I would put down eleven in the south-west monsoon. The Calcutta vessel, I presume, would run down their westing about two degrees to the northward of the line.

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Major *Oliphant.*] Do you propose the Bombay vessel to steam direct to Perim.

Yes.

Are you aware that it is found that if a vessel is going against the monsoon, it is better to go four or five points to the wind, than to go in a direct course?

I am aware that it is a favourite doctrine of the Admiralty steam men: It once happened to myself to be obliged to beat down the Channel in a steamer, *because* we had not power to go a-head. This heresy, if I may so term it, arose from the description of the Admiralty steamers; they are ships with engines in them, and have not power in a head-sea to keep steerage-way, upon them; consequently, were obliged to beat to windward under canvass, and hence arose the opinion, that, because they could not do it, no one else could, and that it was unsafe to steam against a heavy head-sea.

Mr. *Auber.*] Are you decidedly of opinion that, with a vessel of 1,500 tons and 500 horse-power, you could make head against the monsoon?

Decidedly.

And that she could go 160 miles a-day?

Yes? I would stake any reputation I have upon its being done with a proper vessel, good engines and coal, and a good steam Captain.

Chairman.] If the iron vessels draw so much less water, as the difference of 12 to 17, would not their speed be proportionably increased?

Decidedly.

Then she would make more than ten miles an hour?

I should say there would be no difficulty in having an iron vessel to make a much greater average. I shall be very much disappointed, if the iron vessel we are going to build for the American trade does not make her passage in from eleven to twelve days. I believe that she will beat everything, and average 230 to 240 knots per day.

Major *Oliphant.*] Were you acquainted with the Berenice or the Atalanta?

Yes.

Should you consider that their engines were sufficient to propel the vessels against the monsoon?

I know the Semiramis, at the time she was purchased, was the most powerful vessel in the kingdom; and if she had been a longer vessel, I think she would have made much better way against the monsoon in her late trial; and that if she had had proper coal on board, she would, at all events, have got as far as Socotra. I think the Berenice, the Atalanta, and the Semiramis, were all too small for the station; and that is the opinion I gave to the Parliamentary Committee in 1834. I am decidedly of opinion that a 1,000 ton vessel was the smallest that ought to be adopted for the Red Sea line.

Chairman.] You would not recommend any vessel of less than a thousand tons from Bombay?

Decidedly not. I was always in favour of large vessels, but I have become more so from the experience of the last year. We sent out a small vessel called the Sirius, a vessel of 700 tons, to New York: the Great Western sailed four days after her, and arrived twelve hours only after her. The Sirius is as fast a vessel in smooth water, or perhaps faster than the Great Western; but the Great Western overhauled her 700 miles in a run of 3,000. Now the reason is obvious, the power of the paddle acting constantly in a parallel line to the motion of the vessel, the less pitching and ascending you have the better. The Great Western's superior speed I think is mainly attributable to her greater length.

Is she so long as to be out of the usual proportions?

She is 212 feet between the perpendiculars, and 35 to 36 feet beam.

What is her tonnage?

1340 tons.

What would have been her length under ordinary circumstances?

She is about the proper proportions: steam vessels are generally built long. Private steamers are generally built six times of their beam in length.

Mr. *Auber.*] The British Queen is 1865 tons: what is her draught of water?

At her deepest immersion, I calculate she will draw about sixteen feet.

You consider that ample?

Perfectly; I would prefer it less.

Supposing you were to build a vessel of this kind to work between Suez and Calcutta, of 1300 tons, and 400 horse power;—supposing that the vessel was not intended to carry above 100 tons of cargo,—would you build her of a different construction?

Certainly I would, in one respect: I would make a shallower vessel of her; make her float lighter in the water. For instance, the British Queen is 237 feet between the perpendiculars, and 40 feet beam, and 27 feet deep. If I had been building that vessel for passengers only, I would have made her 240 feet long, 36 feet beam, and 24 feet deep. I would have got the vessel to draw two feet less; and of course she would have carried as many passengers, and made a quicker passage: but I built the British Queen, knowing that I could fill her at both ends constantly, both with passengers and cargo.

Of course, if you build a shallow vessel, she is less expensive?

She is less expensive than a deep one. In those East Indian vessels, I would not think of having them any deeper than they could get the necessary length of stroke in.

Major *Oliphant.*] You considered, previous to the dispatch of those vessels to India, that they could not overcome the south-west monsoon?

I thought the Semiramis would do it. I am pretty sure the Semiramis would do it now; she had only 3 lbs. pressure upon her boilers. I think she would do it with good coal, and an old steam commander. I think that Captain Campbell, if he was put on board the Semiramis, would do it; and I cannot account for the commander turning back while he had a pound of fuel left; because he would be always sure of a fair wind to Bombay. As far as the log goes, it is exceedingly satisfactory; for it proves that it is much safer to steam end-on to the sea, than to scud, or to keep her four points from the wind, for he made much worse weather running back to Bombay, than he did going end-on to the sea, and less head-way going four points from the wind than end-on; and I believe that is the general rule with steamers, though the Admiralty commanders generally deny that it is possible to do so.

Mr. *Auber.*] What is the power of the Semiramis?

About 300 horse-power.

That is the largest vessel the East India Company have?

It is.

Are you aware that they are building any others?

I am.

Do you know what power they are?

100 horse-power less than the Semiramis, and the vessel 100 tons larger; they build upon the principle that has been mentioned, of going four points to the wind.

Major *Oliphant.*] Do you know for what purpose they are intended?

I have understood they were intended for the Bombay service.

Is it with a view to the same object as the others?

I do not know what the intentions of the East India Company are.

Mr. *Auber.*] Should you consider that vessels of that build, give any greater hopes of being able to accomplish the monsoon?

No; those vessels will not look at it.

Chairman.] You have given the Committee calculations of a wooden steamer. Have you also got calculations of an iron steamer?

Yes.

The same were read as follows:

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Cost of the Red Sea route in iron vessel 210 feet long, 32 feet beam, 16 feet deep, 60 inch cylinders, and 5 feet 6 in. stroke; cost, complete, 30,000*l.* each	£300,000
20 per cent per annum, to perpetuate the property	60,000
Coals, two-thirds of 82,080*l.*	58,057
Establishment	35,150
Engine expenses	7,500
Coal Hucks	2,500
Floating Establishment on board Iron-boats on the Nile	3,770
Coals for ditto	2,000
	168,977

Wooden vessels	£220,000
Iron ditto ..	168,977
Difference ..	£51,023

Captain *Barber.*] Your estimate is, that an iron boat would cost three-fourths of the cost of a wooden one?

Yes.

Mr. *Read.*] As you say that an iron boat, if she lies by, would suffer so much from oxidation, would it be good policy to have so many iron boats?

That is for you to judge. I mean if you lay an iron boat by for a twelvemonth in dock.

But not for a month or fifteen days?

No; not for a month or two.

Captain *Nairne.*] You say that lying in a stream where there is running water, there is no fear of oxidation?

Yes; I have seen iron boats that I was informed were 30 years old, upon canals, going up and down, carrying manure and different things.

Chairman.] Suppose it was lying in the London Dock?

I would not like to lay an iron steamer in the London Dock, because there might be some action from the copper-bottomed vessels near.

What is your opinion of galvanized iron?

I do not see any necessity for using galvanized iron, when we know that there is no oxidation, as far as we can judge; but I do not think much of that galvanized iron scheme.

Would it destroy the toughness of the iron in any way?

I cannot give an opinion upon that.

Would it have any effect in respect of the needle?

Decidedly not. We have tried a great number of experiments. The influence of the iron gets through every thing.

Have you been yourself on board the Rainbow at the experiments of Professor Airey?

I have not; but I sent Lieutenant Campbell in the Rainbow to Antwerp, to report upon it, and he gave me a very satisfactory report upon the performance of the compass.

Are you aware of any other experiments which have been tried by anybody else?

There have been some experiments tried by Captain Johnstone upon the "Garry Owen." We applied to the Admiralty to get this question settled, and about two years ago they said, "If you will pay all the expenses, we will send an officer to try it." We laid out about 300*l.* upon the question then, and the officer made some very interesting experiments, but he did not settle the question; but Professor Airey settled it the other day.

Mr. *Auber.*] Would the difference of latitude make any difference?

I cannot say; I do not know the principle upon which Professor Airey settled it.

Chairman.] Have you heard of any experiments by a Baron de Bode?

I have not. I consider Professor Airey's experiments to have been conclusive. As soon as we know the principle upon which he settled the point, I should imagine that any person could act upon it.

Major *Oliphant.*] With respect to Perim, do not you think it would be a great inconvenience having neither fuel nor water there?

You might send fuel there, as you have to do to any place you make a station of; I have named Perim as a station, because it divides the distance much better than any other port, has a good harbour, and could be easily reached by coal ships at all seasons.

Mr. T. Ditchborn.

19th Nov 1838.

Mr. THOMAS DITCHBORN was examined as follows:

Chairman.] You are a ship-builder?
Yes; I have been brought up to that.

Have you built many steam-boats?
I suppose about 45 altogether, of iron and wood.

How many iron steam-boats have you built?
About seven; and three or four we have now in hand.

What are the largest sizes of iron boats you have ever built?
Three hundred and fifty tons is the largest.

What sized engines had she?
A couple of forty-fives.

What service was she for?
She was for the Russian Government, as a towing vessel chiefly.

Had she gone out to St. Petersburg?
To Odessa.

Did she steam out herself, or was she towed out?
She steamed out.

Did they put all her power upon her when they steamed her out?
They did.

Do you know what her average speed was?
Ten miles all through: her consumption of coal was at the rate of nine pounds and a half; I had that from the Captain since she arrived.

Was not that rather a large proportion of coal to consume?
No; they considered it very fair: she encountered some very heavy weather.

If she had had larger engines would she have consumed a less proportion of coal per hour?
Certainly not.

Suppose she had had sixty-horse power?
She would have consumed more coals with the same sized boat; she would have averaged ten pounds, or ten and a half.

Was that the best coal?
It was tolerably good coal; they had two sorts on board; perhaps it was not the very best, for the Captain had to supply it on his own account.

What is your opinion as to the relative weight of a wooden vessel and an iron one?
It depends much upon the sort of vessel; we vary from a half to a third?

Suppose you take two vessels, each intended for the same service, say to go to Alexandria, and to carry passengers, each of them 1,500 tons, and assuming that the engines would be the same weight, what would be the weight of an iron vessel, and what would be the weight of a wooden vessel?
Assuming that the build of a wooden vessel would be that which is called the merchant build, it would be about half; but upon the Government build, which is a heavier scantling, we should not save so much; nearly one-third.

For carrying passengers, would you take the Government build, or the Merchant build?
The Merchant build.

Would you think that strong enough?
Yes; provided she had sufficient fastening: the scantling used in the

Merchant build is quite sufficient, provided it is followed up by sufficient bolting and stopping.

You think there would be one-half in weight less?

I think there would; I have not gone into that calculation for a vessel of that magnitude; but we have found that in all that we have had to do with, that upon 300 tons, we can save quite half.

What would be the displacement of a wooden vessel of 1,500 tons?

I suppose her right displacement is 900 tons and upwards.

And what of iron?

It would be half that in proportion to the weight of her hull.

It would be 450 tons?

Yes.

What would be the draught of water of a 1500 ton iron vessel with her engines and her coal?

It would depend upon her form; if she was a sharp vessel she would sink deeper. I should say the draught of water for a sea-going vessel of that description ought not to be less than 12 feet.

Do you mean to say with her cargo and passengers in?

Yes; with her cargo and passengers in; altogether as she would go to sea.

What would be the draught of water of a wooden boat under similar circumstances?

Perhaps she would be 16 or 17 or 18 feet, if she was 1500 tons; you could have a lighter, of course, but to insure her perfect safety, I should not recommend a vessel to go to sea of that description with a less draught of water; she would not be so steady in her course.

Is there much tremulous motion in an iron boat?

I have found much less than in any wooden vessel we have had to do with, so much, indeed, that I have been perfectly astonished that we have heard nothing but the noise of the crank; we have felt no vibration whatever.

Would you build an iron vessel with bulk heads?

Certainly; with sectional bulk heads.

Where would you place the water tanks?

In the hold.

Would you make them independent of the vessel?

That might be done, or it might not.

Which should you think the safest plan?

I think it would be equally safe to have them connected with the vessel, and to have the vessel the bottom of the tanks, that would be safer than having them independent of the vessel, because you have the top part of the tanks attached to the side of the vessel which forms an additional security to the side.

Suppose any accident happened, how would you be able to repair it? Supposing you were to run ashore, or to touch in any way, how would you get at it to repair it, if the vessel formed the bottom of the tank?

You could get at any of the tanks; you must have a clearance to get to the tanks of course. If it cannot be got at in any other way, of course it must be removed. We can make perfectly tight the external part of an iron vessel in a way that we could not do with a wooden one.

What thickness of plate would you have for a vessel of 1500 tons?

I have not considered that; but perhaps the bottom would be three quarters thick.

Should you have any apprehension about an iron vessel of 1500 tons?

Not the slightest.

What length would you have her?

That is rather a matter of opinion; I would myself say 200 feet at least.

Not more than 200 feet?

Not more than that. The mode we adopt in setting out the length of a

Mr. T. Ditchborn.

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a sea-going steamer is to give her fourteen times her beam, with the additional length of her engine-room.

What beam would you have for a vessel of 1500 tons?

We should range from 30 to 40 feet beam; it would depend upon the cross section of the engine, and the height of the centre of gravity, all which we should require to know before we set out the length and breadth of the vessel. We find long and narrow vessels with sharp bottoms uneasy, therefore we are advocates for flat bottoms.

What would be the speed of a vessel of 1500 tons, with 500 horse-power?

That would be rather a large power for her if you wished to run a long distance, inasmuch as the distance is arrived at in a better way by a smaller than by a greater power.

What should you think would be the proper power for a vessel of 1500 tons?

I should say 400 horse-power would be suitable to run a long distance; and you would steam at the rate of 8 miles.

Upon the average?

Yes.

What would be her greatest speed?

About nine and a half, perhaps, with a suitably formed vessel.

How many years would an iron steamer last?

That I am not prepared to say, inasmuch as we have no experience as to that.

Would you have iron boilers or copper?

I think I should prefer iron.

How long would iron boilers last?

With care they would last four years, perhaps five with great care; I have known instances of five years.

How many miles would you calculate a steamer would be able to perform in the course of a year?

That I am hardly prepared to say without going into the particular calculations relative to that.

Should you think 30,000?

Quite that.

Should you think 35,000?

It depends upon the management of course; a vessel may be rendered inefficient upon the first voyage. We built the Nile, and in going to Egypt we had the boiler half ruined.

What tonnage was she?

She was 907 tons.

Suppose you were to undertake the navigation between this and Alexandria to go monthly, how many boats would you think necessary?

That I am not prepared to say, not having considered the matter at all.

Would you have any apprehension of employing an iron boat 240 feet long?

No, certainly not.

You do not think it would be more dangerous than a vessel of 200?

No, nor yet so much: she would be an easier boat at that length, unless there was some very uncouth part about her; rising from a very sharp form to a very full one.

Do you think there would be any greater strain in a long vessel like that?

Certainly not: in a long vessel you have the advantage with the vertical sides of getting the best possible application of strength in the upper works.

You say you would have the lower plates about three quarters thick. What sized plates would you have?

I would say six feet by two feet: six would be a convenient size; of course the larger the better, provided you can make them sound; but I question whether you would get plates three quarters thick in magnitude. We have had much difficulty in getting thin plates beyond the ordinary size of ten to twelve feet, for which they ask us nearly a double price.

They are all rolled plates?
They are.

Do you know anything of that vessel that went over, the other day, from Hull to the Elbe, that sunk?
I saw her pass down the river.

Do you know what were the causes of her loss?
No; I am not aware.

You only know what you saw in the paper?
No.

Do you know what was the effect upon the compass of that vessel going out to Odessa?
They had it elevated above the deck, and they found it perfectly true: they had it elevated seven feet six.

They found it was not affected at all by the iron?
Not the slightest.

You were understood to say that you thought 400 horse power would be sufficient for a vessel of 1500 tons: what room would an engine of that kind take up?
I am hardly prepared to say; inasmuch as they vary according as they are made by different makers.

Should you think seventy or eighty feet?
Comprehending the coal space, I should say quite that.

Would that be too little?
It depends upon the form of the vessel.

What is the largest vessel you have ever built?
Not larger than the Nile.

Have you built any large vessels not steamers?
I was brought up in the Government Dock Yard; and, therefore, we have ranged from a cutter to a first rate.

You have not, yourself, been in the habit of laying down lines for large vessels?
Not larger than the one I mentioned, for the Pacha of Egypt: we built the Braganza, and the Don Juan of 700 tons.

Have you ever made any calculation as to the accommodation for passengers in a large vessel?
Not beyond the Dublin traders, or those which are now in the Peninsular trade.

Have you any idea what quantity of passengers could be accommodated in a vessel of 1500 tons, making proper allowance for the engine-room?
I could not state it off-hand; it would require calculation to do it accurately.

Mr. *Larkins.*] Can you state what would be the expense of an iron vessel of 1500 tons, with 400 horse-power?
We find iron vessels assimilate in price closely to wooden ones: such a vessel might perhaps be built for about 19*l.* a ton.

Captain *Barber.*] Do not you build iron vessels by the ton weight, not by the ton measurement?
Sometimes we do.

What is your price for the ton weight?
We have had for small vessels 32*l.* a ton.

Mr. *Larkins.*] What would you build a vessel of 1500 tons for, including the engine of 400 horse-power?
We have not included the engines: the price of the engines, I apprehend, would be about 50*l.* per horse-power; with duplicates, which you would require of course rather extensively, it would be an additional price to that. That would be the first cost of the engine.

I am to understand that the 19*l.* is for the hull only?
For the hull only; the hull complete, apart from the rigging and the equipments.

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What would be the expense of the rigging and the equipments?

That hardly falls in our department: we have built vessels of 500 tons with the rigging. About 2,000*l.* would probably cover the equipment of the rig; if you had it well performed for sailing trim, not in the usual slight way of steamers.

Mr. *Auber.*] Do you include the decks in the expense of the hull?

Yes.

Chairman.] What was the price, per ton, of the vessel that went to Odessa, as she went to sea?

About 12*l.* a ton. We lost by that vessel 800*l.* on the prime cost account: she would have stood 15*l.* a ton,—a fair remunerating price, the hull complete, apart from the engines.

What would she stand at, to go to sea; including engines, and everything?

I am not aware of that; because we had nothing to do but with the hull and the equipments.

You think the cost was 15*l.* a ton?

Yes; that is what we should ask to build such another vessel.

Mr. *Larkins.*] But for a larger vessel you would ask 19*l.* a ton?

Yes; she was a very superficial vessel; very slightly-fitted, indeed.

Chairman.] You say 19*l.* a ton for the hull alone?

Yes.

What would a wooden vessel be of the same size?

Something like 22*l.* a ton, taking the fittings.

Do you include the fittings, when you say 19*l.* for an iron vessel?

Yes.

Then a wooden boat would be 22*l.* a ton, and an iron boat 19*l.*?

Yes; of course the one in question would have an increased price: 19*l.* is a high price for it; inasmuch as it is an extraordinary vessel; and the preparations would be out of the ordinary course to realize her.

Would it make any great difference if it was 1,300 tons instead of 1,500?

No; the scantling would be nearly the same. Coming down to 500 or 700 tons, you would get a vessel for 14*l.* a ton; perhaps 13*l.*

If you were to lay down an iron boat of 1,500 tons, what beam would you recommend her to be of?

That would depend upon the arrangement of the machinery, in a great measure; we should range the beam from 30 to 40 feet. Different artists would assume a different form in the setting out; some prefer a long straight ship in the midships; and others a very great breadth, and no straight at all; and, therefore, probably the narrow one would be 30 feet, and the broad one 40; all depending entirely upon the different views of the two artists. And, again, if we have the common ship's section, it throws up the engine considerably higher, which requires an extension of breadth to secure the stability; it is quite matter of judgment on the part of the artist, what breadth and what length would be given to arrive at the same tonnage.

Mr. *Larkins.*] But you would have her more than 240 feet long, with 40 feet beam?

It is likely; it is rather out of my usual practice to speak with respect to vessels of so great a tonnage as 1,500 tons; 1,000 tons I could speak to in a moment.

Mr. *Auber.*] But you would have no hesitation in building one, and going to sea in one of 1,500?

Certainly not.

Captain *Barber.*] You have stated that 400 horse-power is the power you would apply to a 1,500 ton boat; are the Committee to understand that the speed would not be increased with increased power?

Assuredly it would be increased; but the consumption of coal would be increased?

But supposing the boat could carry a sufficient quantity of coals, you would recommend her to have 500 horse-power, instead of 400?

Certainly; if the consumption of coal was not an object, and she had room to carry it.

Chairman.] What do you think would be the consumption of coal, per horse per hour, in a vessel of that size, with 400 horse-power?

From 7 to 8 lbs. would be a small consumption, I should say.

Would you think 9 lbs. would be nearer the mark?

Yes; we have averaged in vessels of large power of from 500 to 1,000 tons from 9 to 12 lbs. You do not get the true representation of the consumption of fuel, from the number of strokes, and so on; but, by taking the cylinder every time it is emptied and filled, you get, of course, the exact consumption of coal; because a certain portion of coal generates a certain portion of steam, and the cylinder becomes the measure of that proportion.

Captain *Barber.*] Are you aware what has been the consumption of coal in the "Great Western" during its last voyages?

I am not; I am so occupied with my every-day's business that I have had very little opportunity to arrive at any information in that way; but I should say it is very small, inasmuch as Maudslay's application of fuel is generally very limited.

Having built a great many wooden steamers, and having turned your attention now to the building of iron boats, which do you consider to be the preferable boat for service as to wear and tear, and effective service in every point?

I should say the iron, without any hesitation; I should decidedly prefer going to sea in an iron vessel to a wooden one.

Mr. *Larkins.*] Are you aware that the East India Company are now building some wooden steam-vessels?

No, I am not aware of that.

Mr. *Auber.*] You say you would have no hesitation in going to sea in a 1,500 ton iron boat; but you would require, previous to building that boat, to have a good deal of information with regard to the engines?

To adapt the vessel to them.

Would you be prepared, without further consideration, to give the Committee decided information upon the length and breadth?

I could not exactly: I could only say that the length would be from 200 feet and upwards, and from 30 to 40 feet in breadth, which would be regulated in part by the nature of the engine, and the form of the midship section.

Chairman.] Suppose you had a beam of 40 feet, what length would you take then?

We should make her four times, and put the additional length of the engine-room into that.

You multiply the breadth of the beam by four, and take the length of the engine-room besides?

Yes.

But you say you cannot tell what the length of the engine-room would be?

We get it from the engineer.

Mr. *Auber.*] Then you have no difficulty in saying that it would be 240 feet in length?

It would; but whether that would give you the tonnage, I cannot say without trying it.

Captain *Barber.*] But you think it is possible to build an iron boat 240 feet long?

Yes; we have an uniform strength coming out of iron, that we cannot preserve in wood. There is no ship in the Government service from 240 feet long, but what is broken from three to seven inches in the launching.

Chairman.] Have you seen anything of a new system of rivetting of Mr. Fairbairn's?

I have not seen it; I have heard of it, I am not able to express any opinion upon it.

Have you seen any rivets made by it?

I have not: we have used patent rivets made at Birmingham, but we have found no advantage from it. I am not aware that that new apparatus is applicable to this purpose. It was brought forward by Mr. Fairbairn during the turning out of his men, for the purpose of shewing them that they could ultimately be done without if they did not behave themselves.

(Adjourned.)

Friday, *23rd November*, 1838.

PRESENT.

Mr. Mac Killop.	Major Oliphant.
Mr. Larkins.	Captain Nairne, H.C.S.
Mr. Gouger.	Mr. John Small.
Mr. Stewart.	Mr. P. Auber.
Mr. C. Read.	

T. A. CURTIS, Esq., in the Chair.

Capt. J. Barber.

23rd Nov. 1838.

Captain *Barber* delivered to each member of the Committee lithographed copies of the comparative estimate of three timber steam-ships; one of 1,500 tons, one of 1,250 tons, and one of 1,000 tons burthen, and of the annual expense of each boat on this side Egypt; also of the outlay, annual expense, and earnings of five boats.

CAPTAIN JAMES BARBER was further examined as follows:

Chairman.] How many passengers did you calculate for each boat of 1,500 tons in your original statement?

One hundred in my original statement; but then I calculated putting two in a cabin.

In this new estimate that you have given in, you only calculate upon 86 passengers?

No; but every one has a separate cabin; that is to say, there are some double cabins, supposing there are two ladies, or a man and his wife.

Are the Committee to understand that, according to the plan of the boat which you have delivered in, there can be eighty-six persons accommodated?

Yes.

What keel would you have for an iron vessel?

I have had a great deal of conversation with those men who have known the thing practically, and they say that the only keel they would have for an iron boat is indenting the lower plate, which is more to collect the bilge-water and things of that kind than for anything else.

How would she stand a gale of wind without a keel?

She would do well enough without a keel; the great service of a keel is when she is going to windward, but that is the way they make the keel by making the lower plate into a sort of trough.

(Adjourned.)

Friday, 30*th November*, 1838.

PRESENT.

Mr. Read.	Major Turner.
Mr. Stewart.	Mr. Mackillop.
Mr. Larkins.	Mr. Auber.
Captain Nairne.	Mr. Gouger.
Mr. Small.	Major Oliphant.

T. A. CURTIS, Esq., in the Chair.

The following letter, addressed by Lord William Bentinck to the Chairman of the committee, was delivered in and read.

Lord W. Bentinck.

30th Nov. 1838.

"Sir, *Park Place*, Nov. 29th, 1838.

"I have to acknowledge your note of the 6th instant, transmitting to me a desire on the part of the Committee, that I would make known to them any plan or suggestion which I might have to offer, for carrying into effect the Comprehensive Scheme of Steam Communication between England and the Government of India, *viâ* the Red Sea.

"I have already had the honor of laying before you a letter addressed by me to the Court of Directors of the East India Company, on the 14th of August last, in which I submitted this question; 'If a private company were formed which would afford the most ample means for carrying out the Comprehensive Scheme, whether the Court of Directors and her Majesty's Government would be prepared for a term of seven years to pay an amount not exceeding two-thirds of the present charge incurred for the limited communication with Bombay, such agreement while open to a revision at the expiration of that period if reasonable grounds should appear for the remission of any part of the end sought for?'

"The Court answered, 'That having so recently undertaken jointly with Her Majesty's Government the conveyance of the public mails, they are of opinion, that the principle of that measure should be maintained, until at least it has had a fair and complete trial in point both of efficiency and expense.'

"It is added at the same time, 'without pledging themselves to the final adoption of the measure, the Court will be happy to receive from your Lordship any detailed information in illustration of your proposals, which you may be desirous to lay before them.'

"At this point of the correspondence, the general meeting took place, and your committee was appointed; and I transfer with much satisfaction, the further prosecution of this object to those whose connexion with the mercantile world, and whose general knowledge and respectability must give them such powerful weight both with the authorities and with the public at large.

"The latter paragraph of the Court's letter presents an opening, of which I should have availed myself for supporting that opinion which I expressed at the late meeting, 'that the East India Company cannot carry out this measure with that degree of extensive operation or that efficient management which the public in India have so long been in vain calling for, and which the interests of commerce, and the political and military state of affairs in the East at this moment so imperiously demand.

"The committee of the House of Commons in July, 1834, resolved that a regular and expeditious communication with India by steam vessels, was an object of great importance to Great Britain and India, and that its practicability having been established, it should be immediately carried into effect. They also came to a further resolution which was also adopted by the House, that, as a subsidiary but more doubtful measure, £20,000 should be granted for trying the experiment of establishing Steam Navigation on the Euphrates.

"In July, 1837, another committee of the House of Commons expressed the same sentiments upon the general question, with this important addition,—that the practicability of extending the communication with all the Presidencies in India had been established. An opinion of the expediency of such larger extension had been given by the Lords of the Treasury, to the Court of Directors of the East India Company.

"Four years and a half have now elapsed since the first parliamentary resolution in favor of the immediate execution of this undertaking, and nothing can more strongly contrast the activity of private adventure with the inertness inherent in a public establishment than the fact, that in this long period only three steamers have been sent to India, the Atalanta, Berenice, and Semiramis, while the Peninsular Steam Navigation Company

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have, since 1834, launched five vessels; the General Steam Navigation Company in the same time eight vessels; and within the last eighteen months, five steamers of unexampled power and tonnage have been launched from different merchants' yards for the Transatlantic Navigation.

"This tardy and imperfect performance, is supposed to be attributable to the indisposition of the authorities entrusted with the execution. Of the various reasons assigned for this unwillingness, that of expense appears to be the most justifiable, for whoever is acquainted with the costliness of all public European Agency in India, must be well aware of the reasonableness of the apprehension. But the fact, if true, only more forcibly recommends the transfer of it to a private Company, by whom a vigilant superintendence and rigid economy could be better enforced.

"Nothing can demonstrate more clearly the unsuitableness of a public administration, combining commercial with political purposes, than the inferiority in point of power of the Government Steamers employed on the portion of the line with India between Malta and Alexandria, as compared with those of the Peninsular Steam Company. Nor can it well be otherwise with a department of the state, obliged to exhibit before Parliament regular estimates, and to observe the strictest economy. It is impossible for them to keep pace with the improvements in daily progress in the mercantile marine. They must wear their vessels, and they cannot and ought not to have the same power of exchanging, converting, and replacing their property as private establishments, between whom a continual race for pre-eminence is going on. Parliament and the public would never consent to such an expense. The Admiralty therefore are wisely advertising for contracts for this part of the service.

"But if the Board of Admiralty, admirably composed as it is, and always acting under the influence of a severe criticism on the part of the public, cannot effect this object as cheaply or efficiently as a company, how can a different result be expected in India, (most efficient as Captain Olivier, lately appointed to the command of the Bombay Marine, is admitted to be)—where the same energy, the same establishments, and the same checks do not so powerfully operate.

"In the year 1835, in answer to an address from the merchants of Calcutta, in which the usefulness of Steam was adverted to, I expressed the following opinion:—'But an efficient Marine Steam Establishment in India is called for by considerations more powerful, even than those of commercial advantage, or improved political control. It would multiply in a ratio little understood, the defensive means of the Empire. Let me advert to one event—the particulars of which are within your recollection—the Burmese War. If five powerful Steamers had then been at our command, to bring up in quick succession all necessary supplies and reinforcements, the war would probably have terminated in a few months, and many millions of treasure, many thousands of lives, and extraordinary misery and sickness would have been averted.'

"The same remark is equally applicable to the actual state of military operations. According to the latest published intelligence from India, a large force is collecting upon the Sutlege and Indus, with the intention of being moved up into Central Asia.

"The country of the Afghans, for which this force is said to be destined, has for many years past been in a state of the greatest confusion, and of general disorganization. As in most other Asiatic Countries, the roads are very bad, the passes are exceedingly strong, and the difficulty of providing supplies and carriage, must necessarily be difficult and precarious.

"In the event of operations, Bombay will become one of the principal magazines; and the Indus the shortest and readiest route for the transport of all Military Stores, and of the troops coming from either side of the Peninsula, but to realize all the advantages of this route, to overcome the adverse monsoons by sea, and the descending stream of the Indus, reliance must principally be had upon Steam power. And how incalculably improved our military attitude would have been at the present moment, had the representations from India, and the recommendation of Parliament in 1834 for the immediate introduction of Steam power been rigorously acted upon! India long ere this would have had an efficient Steam War Establishment, for which all the vessels sent out, together with those now upon the stocks, are not more than adequate. The communication between England and India, under proper encouragement, would likewise have been ample, and as one successful measure never fails to give impulse to others in the same direction, the Indus with the five rivers of the Punjab, would in all probability ere this, have enjoyed the benefits of Steam Navigation.

"Apologising for the length of these prefatory remarks, I will proceed to submit my views for carrying out the comprehensive plan by a private company.

"Each of the two lines by the Red Sea and the Cape of Good Hope has its particular advantages. The latter would be independent of political contingencies, and would probably be selected by a considerable proportion of invalids, women and children.

"On the other hand, the hurricanes off the Mauritius, the absence of all means of repair in the event of injury to any part of the machinery in the midst of the Atlantic, could not fail to operate strongly on the minds of many against encountering a voyage by the Cape, which would also occupy at least ten days longer than that by the Red Sea; but, unless steamers could accomplish a much longer run than is at present deemed prudent for a vessel in the course of any one year, the expense of the Cape route would much exceed that through Egypt. I am aware, that a considerable feeling exists in favour of the Cape route; but weighing the whole of the circumstances, the reasons in favour of the Red Sea, seem decidedly to predominate. It has, already, been sanctioned by Parliament. It has

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stood the test of frequent experiment; it offers peculiar attractions to travellers, and the testimony of all who have traversed that route to and from India, concurs in giving it a decided preference.

"Three vessels of 1,000 tons and 300 horse-power, may be deemed adequate for the service between England and Alexandria, because many of the passengers would proceed by the continent. The aggregate distance to be accomplished is 72,000 miles. Looking at the fair wear and tear it would not be prudent to undertake the duty with a less force.

"The means of a convenient transport between Alexandria and Suez might easily be arranged, and could not amount to any considerable annual charge.

"The next point is the route from Suez to Calcutta, including Bombay. Considering what steamers have accomplished, the distance, 3,500 miles, may not be deemed too long a run, more especially when it is proposed to change the vessels which shall work this part of the route every month.

"One steamer would perform the voyage from Calcutta to Galle, calling at Madras. A second vessel would accomplish the line between Galle and Suez, replacing her stock of coals either at Suez, or at any of those intermediate depôts from Socotra to Mocha, which the repeated voyages at different seasons, will have shown to be the most convenient; while a third, would meet the service between Bombay and Galle, or between Bombay and such other station as in the favourable monsoon might be thought most eligible.

"To the whole of the service on the Eastern side, I should, therefore, propose five wooden boats of the following size and power, 1,350 tons, and 400 horse-power, all these vessels should be similar in every respect as far as possible. The models ought to be formed upon that principle which experience has confirmed, and every novel theory should be carefully avoided, except, indeed, Hall's condensers, the efficiency of which, in respect to the boilers, has been established by many experiments, and recently, in H.M.'s ship 'Megæra,' under the careful direction of Lieutenant Goldsmith, with complete success.

"The working of this plan would secure both Bombay and Calcutta as places where repairs to a great extent could be effected; the facilities for which will, doubtless, be rapidly increased at each of those Presidencies as Steam Navigation shall be extended.

"The cost of these eight boats fitted complete for sea, may be taken at £45 per ton, including machinery and all other necessaries.

"I purposely abstain from entering into figured details, but the Committee will clearly understand it to be my opinion, that with our very imperfect means of forming any well-founded estimate of the future traffic, either in passengers or merchandise, no company can enter upon this undertaking, with a fair prospect of success, without aid from her Majesty's Government and from the East India Company.

"If such limited aid as two-thirds of the present charge to Bombay only were granted, a company would be enabled to accomplish all the objects that the most sanguine advocates of Steam Communication have anticipated, and the safety of those distant and valuable possessions would be better secured. Documents and consultations of the councils of India, indispensable to a sound judgment upon all public transactions, and not transmissible by the present route, could be received, orders promptly given, wars perhaps prevented, and the interests of India and England better understood and more firmly cemented.

"The commercial and other public correspondence would be conveyed to and from the several Presidencies with certainty and celerity, and the social wants of the British and native community would be amply provided for, while the steam flotilla of the East India Company would form a distinct establishment, devoted exclusively as powerful adjuncts to the army and navy, to the defence of the empire and to those other purposes of the general government, the suppression of piracy among others, which steamers can so much better execute than either men-of-war or transports.

"Having described the outline of the plan which you invited me to communicate, I now will take the liberty of mentioning the suggestion, which, in the failure of all aid from the East India Company, I had intended to make to the subscribers to the Steam Fund in India as best calculated to promote this great object.

"I should have said to them, you must now depend upon your own exertions. The comprehensive scheme is or is not practicable, that is to say, the capital to be laid out will or will not make an adequate return. You have in your own hands in the £140,000 subscribed for the purpose, the means of making the experiment, and you cannot and ought not to expect the English capitalist to embark largely in this undertaking, without some better data than the hitherto inefficient means employed by the East India Company afford to ascertain the real amount of the traffic, of the expenditure and income.

"To try the experiment fully and fairly, it appears to me that two vessels of the before-mentioned tonnage, 1,350 tons and 400 horse-power, would be sufficient to be constructed, the vessels by John Wood and the engines by Robert Napier, of Glasgow, the builders of the Berenice, the best of the three Indian steamers, and of the Dundee boats, among the best and fastest on the west coast. These vessels to be exact copies of each other, to sail to India together for mutual protection, and to take out an abundant supply of engineers and machinery.

"When arrived in India, it might be arranged, that these vessels should sail alternately with the Government steamers, or if in competition with them, the advantages of their superior size and power would be more strongly exhibited. The comfort of the accommodation would reduce to a certainty the amount of traffic, the more eligible track from Calcutta by Galle to the Red Sea, by which, except in very small portions of the space to be run, the full force of an opposing monsoon need never be encountered,—would greatly

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diminish the wear and tear of machinery, and prevent those other disappointments so often experienced in the route from Bombay.

"The sum of £140,000 would very much more than equip two such vessels for sea.

"A full freight might be expected to pay at least the outward voyage; and in the event of ultimate failure, these vessels might either be advantageously sold to the Government in India, or if refused by them, they might be sent back to England with a profitable cargo, and disposed of in the home market.

"These two vessels would equally prove the practicability of the Cape Line.

"Most desirable would it be that both lines, and I may add also Inland Steam Navigation, in India could be placed under the superintendence of one single great company. Each line would essentially contribute to the success of the other. To the Red Sea line the succession of new and improved steamers from Europe would impart great efficiency to that of the Cape. The large establishments, which the centralization of all steam agency in one hand would give the means of maintaining, would contribute to the prosperity of the other.

"The Inland Steam would be a nursery of engineers and artizans for both.

"I have the honour to be, Sir,
"Your obedient servant,
"W. BENTINCK."

The following Papers, containing remarks and suggestions by Captain Henderson were delivered in and read:—

Capt. Henderson.

"On the question of the practicability of building a very large vessel of iron, I do not think the advantages obtained in smaller vessels will be so great in very large ones. Being much interested in obtaining a vessel of great speed, I visited the vessels (iron) building at Liverpool and Glasgow, and at the former procured estimates of the weight and cost of a vessel 110 feet by 27, about 400 tons. This vessel's sides were from 5-16ths to 6-16ths of an inch thick, with frames and three bulk heads, and part of the beams of iron, part of the beams and deck of pine. The estimated weight of the hull of this vessel was 80 tons; the weight of a vessel of the same size, if built of teak, ascertained by experiment, would be about 200 tons, and if taken from the data furnished by Mr. Edy's book, as in the navy, it would be 220 tons.

"This shews a great reduction no doubt, but it must be borne in mind that so small a vessel, even at the slightest scantling, is stronger in proportion than a very large one. We will suppose an iron vessel of 1,500 tons, she would be, say 225 feet long, and 37½ broad, she would displace when loaded, say 2,400 tons. If built of wood the hull would weigh about 850 tons, which would leave 1,550 for engines, coal, masts, stores, and cargo. If built of iron, perhaps the weight may be about half or 425 tons, or about one-sixth of the whole displacement less than timber, which would not reduce the resistance more than one-twentieth, I should think, at a speed of eleven knots.

"But I much doubt if the weight can be reduced so much; the weight of a square foot of the small vessel 6-16ths is fifteen pounds; now so large a vessel to have the requisite strength, ought to have the plates of her bottom one inch thick, at which size it would be very difficult to get plates of length sufficient to give a good shift, as also to work it to a mould, as you can do the smaller, and the weight would be greater in proportion, a foot of one inch weighing fifty pounds. For so very long a vessel the frames, floorings, and bulk-heads, and diagonal trusses, must all be very heavy, and I have no doubt that if the calculation is gone into by one who has had experience of building and finishing an iron vessel, the difference will not be so great as expected.

"As to cheapness—The very circumstance of the requisite increased size of the plates will add thirty or forty per cent. to the cost of the iron, and the workmanship must be in the same ratio.

"From having had some experience of the difficulties of adapting a steam vessel to a long voyage some ten years ago, I have always sought information on the subject, and watched with much anxiety the development of the different schemes and improvements that have been making, and particularly since my return from India, sixteen months since, during which time very great advance has been made, from the experience gained from the voyages of the three steamers to India, and of the 'Sirius,' 'Great Western,' and 'Royal William,' to America.

"The improvements consist of being now able to prevent the accumulation of salt in the boilers, and a considerable saving of fuel by working the steam expansively; even at present they are thus enabled to carry sixteen and eighteen days' fuel, and I trust that ere long they will be able to carry thirty days.

"The result of these voyages has clearly proved that the greatest capability for distance is obtained by the largest vessel. The largest now running is the 'Great Western,' 1,340 tons, 450 horse-power, and whose relative proportions of breadth to length are 5·88 times as long as she is broad. And the 'British Queen' will shortly be running, of 1,860 tons, 480 horse-power, and whose relative proportions are 5·92, and I find that English vessels have been built at various dimensions, from seven to five times as long as they are broad. The American boats now range from 10¼ to 5¼ times as long as broad; they must vary with the size of the vessel, and the service she is intended for.

"Looking to the great advantage to be derived from having a vessel of great capacity, has led me to think that a proportion of 5·75, as long as they are broad, are best suited to

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to the purposes of making the longest run without requiring a relay of coal, which would be from Point de Galle to Suez, 3,500 miles. On such proportions I think the best size would be 240 feet long, by 42 feet beam; which should measure about 2,000 tons, which at a fair loaded draught would displace about 3,000 tons, if built of the usual scantling used in the navy, the material of her hull would weigh about 1,200 tons, but I think by adopting a better system of timbering and strengthening her, and iron bulkheads, and diagonal trusses, it might be reduced to 1,000 tons.

"Which would leave us a capacity of 2000 tons, available for engine, fuel, masts, stores, provisions, passengers, crew and cargo, thus—

Weight of Engine, say 550 horse-power	650 tons.
Ditto 25 days' fuel, *a* 7lbs. . .	900
Masts, anchors, stores, provisions, and crew	200
Cargo	250
	Total 2,000

"This would be at a fair steaming trim, and might be increased by 200 tons without materially affecting her speed.

"The great first cost of so large a vessel may be urged as against it, which I think will not be so great as the increased tonnage, as there are many items in the outfit of such a vessel, which would be nearly the same in a vessel of 1,200 tons. The officers would be the same in both, and a few more seamen and firemen would be all the difference. The possession of capacity would enable you to adopt the best description of boiler for economizing fuel, which will be of the greatest importance in India.

"With respect to the power requisite, I find that various proportions have been used from 5½ tons per horse-power to 2½ tons per horse-power, and that experience has proved that the consumption of fuel for a given distance is less, the smaller the power in proportion to the tonnage. Taking into consideration the great size of the vessel, I think we may estimate the speed of 11½ to 12 knots will be obtained from an engine of 550 horse-power.

"The British Queen's engines are of 480 horse-power, the cylinder being 78 inches diameter and 84 inch length of stroke. 'The President,' preparing by Messrs. Fawcett, Preston and Co., is 540 horse-power or 80 inch diameter, and 90 inch length of stroke. These have the greatest length of stroke of any Marine Engines yet manufactured, being the diameter as $\frac{92}{100}$ to $\frac{88}{100}$ of the length of stroke.

"I find from a work lately published on the steam boats of America, that they have there carried the system of working steam expansively to much greater length than has been attempted in this country, cutting off the steam at one-half and one-third the stroke, and that with very long cylinders, varying from $\frac{46}{100}$ to $\frac{31}{100}$ the diameter of the length; I would propose for this vessel a cylinder $\frac{66}{100}$ or about six feet diameter and nine feet stroke, which would be as long as could be got into a vessel even of that size, perpendicular (the Americans being horizontal.) The great advantage gained by this is, that with a fair wind, the full speed could be obtained at a very reduced consumption of fuel.

"Experience has proved that the present system of Steam Communication with India is in every way inefficient; and particularly so to the residents in the Bengal and Madras presidencies, as the difficulties of a land journey to Bombay preclude passengers from the advantages of that route. To obviate this inconvenience, the residents on that side of India expended 7000*l*. in an experiment, by sending the Forbes steamer from Calcutta to Suez, in 1805, principally to prove the practicability of a steamer making a passage from Point de Galle to Suez in the south-west monsoon. They have since that subscribed for shares to the extent of 140,000*l*. to any comprehensive scheme that should obtain for them the same advantage as Bombay alone has heretofore possessed. I find that in August, 1838, the Committee of this Fund memorialized the Supreme Government on the subject of the loss and disappointment caused by the return of the "Semiramis,"—That 2539 letters were detained 85 days in Bombay; that this second failure proves the impracticability of making the passage *direct* from Bombay, and requesting the interference of the Governor General to the end that the steamer should start from Ceylon during the south-west monsoon; and that it is their intention to petition Parliament on the subject. To further which I would suggest that the merchants and others interested in the regularity of the mail from India should address the Governor and Court of Directors to send orders to Bombay that the steamer should start from Point de Galle for Suez, during the strength of the south-west monsoon. I now proceed to consider the best mode of establishing a better system of Steam Communication; with the means we are likely to have available within a year, leaving the details of land carriage, and even the communication to Alexandria, for after consideration, that advantage may be taken of the improvements making in steam engines and iron vessels, and because it would require upwards of three years to complete, and an outlay of 600,000*l*.: a sum not likely to be obtained while there is so much uncertainty as to a profitable investment.

"I shall assume that a Company is established here, in conjunction with the subscribers to the Comprehensive Scheme, and other residents in India. It would require eighteen months before you could build and have a new vessel working in India, and then only alternately with the present establishment. I should immediately contract with two of the first engineers for the manufacture of a pair of marine engines, each about 550 horse-power, say six feet cylinders and nine feet stroke; to have Hall's condensers, and all such improvements as may be

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suggested by the experiments now making. Such an engine could be built in one year, and at a cost of about 26,000*l.*

"For these engines I propose to build two vessels of 2,000 tons, or 240 feet long, by 42 feet broad: one vessel to be built in England, the other in Calcutta. I recommend the latter from the fact, that the "Enterprize," which went to India in 1825, was obliged to be rebuilt of Teak when she had been only four years in India: and further, that the money subscribed by residents in India, would be available to the purpose at once. With these two vessels, three voyages might be made during 1841; or, if both were employed in India, and vessels chartered between England and Alexandria, eight trips could be made in a year, about 36,000 miles each vessel, leaving the others to be done by the present establishment from Bombay.

I conceive that this may be effected with a paid-up capital of 150,000*l.*, which I estimate as follows:

Cost of a pair of Engines, as above, erected in England	£26,000
Vessel built in England, hull, spars, &c., 15*l.* per ton	30,000
Cabins, cables, sails, rigging, and stores, 3*l.* per ton.	6,000
Total cost of Vessel in England	£62,000
Cost of a pair of Engines packed for shipment to India	£25,000
Freight of engines, and cost of erection in India	2,000
Cost of Vessel, 2,000 tons, built in Calcutta, if all the iron-work, copper, bolts, cables, sails, stores and fittings are sent from England as fitted for sea, 200 rupees per ton, at 2*s.* per rupee	40,000
Total cost of Vessel built in India.	£67,000

The remainder of the capital would be required to establish coal depots and charter vessels. The cost of each voyage from Calcutta to Suez, I estimate thus: From Calcutta to Suez, 4,600 miles, at nine knots, would be about 22 steaming days, 528 hours, × 550 horse-power, at 6lbs. coal, would require 751 tons of coal, which, if shipped in Bengal, (as a large ship only could) at 5lbs. per maund .... Rupees 6,600

650 Tons of Welsh coal, at Suez, at 50*s.* per ton	17,000
100 Tons of Burdwan coal at Galle, at 12 lbs. per maund	2,250
Oil and engine stores, &c.	1,150
Rupees	27,000
Wages and provision of officers and crew, as per statement, 33 rupees per month, three months, say	10,000
Interest and Insurance, say	15,000
Total cost of each voyage to Suez, Rupees.	52,000

"Such a vessel would afford good airy accommodation to 120 passengers, and if 980 passengers came from Bombay last year, I think we may fully expect all available cabins would be filled from the Three Presidencies and Ceylon; which at the rates now paid from Bombay, may be fairly estimated at 80 to 90,000 rupees the voyage there and back.

Estimate of Sailing Expenses of large Steamers in India.

1 Captain, per month	500
1 First Officer, ditto	150
1 Second ditto, ditto	100
1 Third ditto, ditto	70
1 Purser, ditto	100
1 Surgeon ditto	60
2 Gunner and Steward, each 40 rupees	80
6 Seaconnies at 20 rupees each	120
1 Syrang, per month	30
6 Tyndals at 15 rupees each	90
60 Lascars at 9 rupees each	540
1 Chief Engineer, per month	250
1 Second ditto	150
1 Third ditto	100
1 Fourth ditto	60
2 Carpenter and Blacksmith, 50 rupees each	100
20 Stokers at 14 rupees each	280
2 Boys at 8 rupees each	16
Total Wages	2796

Capt. Henderson.

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The Captain, or whoever provides the passengers' table at a fixed rate of four or five rupees per diem, will provide the table for Captain, first and second Officer, Surgeon, and Purser, as is customary.		
A mess consisting of third Mate, three Engineers, would be well supplied for one rupee per diem each, or per month	120	rupees.
Another consisting of Gunner, Steward, Carpenter, and Blacksmith, at twelve rupees each	48	
Seaconnies, six at six rupees per month each	36	
Native provisions for 100 men, including servants, consisting of forty bags rice, four bags dholl, three maunds ghee, ten maunds salt-fish, ten maunds of vegetables and curry stuff per month ..	300	
• Total monthly cost of wages and provisions	3300	

The cost of fuel I estimate as follows—The distance from Calcutta to Suez altogether is 4800 miles, which at eleven knots she would accomplish in 18¼ days. If it is ten knots, in twenty days; and if nine knots, in 22 days; which I have no doubt she would make with the steam cut off at half stroke, which would be at a consumption of 4½ to 5 lbs. of coal per horse-power per hour. But to keep within the estimate, I take 6 lbs. as a fair amount; thus 528 hours × 550 horse-power × 6 lbs. would give 751 tons. If shipped in Calcutta, Burdwan coal at five Ann. per maund ..	6571	rupees.
600 tons of Welsh coal at Suez at 60*s*. per ton	18000	
150 tons Burdwan coal, at Galle or Madras, at 12 Annas or about 21 rupees per ton	3150	
Expense of grease and oil per voyage	279	
	28000	
Allowing for contingencies	2000	
We may estimate the cost of fuel for each voyage at	30000	rupees.

London, 30th Nov. 1838 ANDREW HENDERSON."

The following letter, addressed by Mr. Harding to Mr. Small, was delivered in and read:—

Mr. B. Harding.

MY DEAR SMALL,

"I am now obliged to leave town and shall be absent a month. As the committee has not yet found leisure to question me, I think it best to commit to paper a note of the few matters connected with the subject of your deliberation, that appeared to me likely to be useful and not already before you.

I am, dear Small, yours truly,

Albany, 29th Nov. 1838 B. HARDING.

Passengers—When the Bengal Steam Fund committee were prosecuting the enquiry at Calcutta, a return was obtained from the Police authorities at the three Presidencies, of the total number of persons arriving and departing by ships. This was done in the year 1833, and the result was 3,200 persons (inclusive of Ceylon).* No other investigation was, that I know of, ever made, and this was the ground on which various parties gave their evidence to the committee of the House of Commons, and on which Dr. Lardner and other writers stated the personal traffic between Europe and India to be 3,200 annually.

"Formerly, when the ingress of Europeans and their residence in India, were very strictly watched and controlled by the company, the entries by commanders of ships at the Police Offices might be depended on, but of late years, the regulations enforcing these entries had become in effect a dead letter, and upon mature reflection I am inclined to believe that the real number of ship-passengers was at the period mentioned, at least one-third more, say 4,300. At the present time the intercourse must far exceed that of 1833, it is fair to infer, that an increase in the number of passengers to and from India, has taken place corresponding with that of shipping, particularly as that class of vessels termed, "Passenger ships" have multiplied with the rest, and that the new ships introduced into the trade are

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*

	Arrived.	Sailed.
Calcutta	767	 665
Madras	573	 459
Bombay	287	 316
Ceylon	85	 17
	1712	1457

Mr. B. Harding.

30th Nov. 1838.

generally of larger burden and of superior capacity as to cabins, I advert more especially to the traffic to and from Calcutta, where I resided from 1823 to 1838.

"Investigating the proportion of the entire traffic between Europe and India, that might be attracted to the Red Sea route by a well organized undertaking, capable of conveying passengers at a charge not greater than now incurred by Cape ships, the following circumstances would have to be considered.

1. "Outward passengers generally will regard expedition and economy more than luxurious accommodation, or treatment, or exemption from fatigue and annoyance from climate. They would therefore disregard the unfavourable months for crossing Egypt or landing in India. They will mostly be indifferent about loitering to visit antiquities, scenery, and other objects of attraction to travellers. A company may therefore reckon on enjoying a more regular demand for passages outward, and as Quarantine is avoided for passages "through" as the coachmen say, i. e. from England to India.

2. "Homewards, a large portion of the passengers would consist of families, invalids or persons unprepared to encounter rough usage. Expence with many, will be a secondary consideration, and to some extent time would be less valuable. Passages will be applied for at the best season beyond the means of the Company to accommodate, and for stages of the entire route only say from India to Cosseir, whence the traveller may wish to proceed to Thebes and the Nile, or from Alexandria to Malta, whence he will often prefer making a circuit through Sicily, Italy, and France.

3. "No judgment can be formed of the extent of the personal intercourse likely to be enjoyed by a Company, by reference to the last Steam Conveyance, which has hitherto been confined to Bombay, and been irregular and precarious in the extreme. Bombay for a portion of the year, is inaccessible from other parts of India altogether. The expence and loss of time incurred in reaching that port at other seasons is considerable enough to out-balance all the advantages of the Red Sea route as now circumstanced. On the other hand, many parties from that side the Isthmus have been deterred from taking the route by the fear of not finding a steamer at Suez, of having to put up with an inferior conveyance, or having to wait for weeks for any conveyance at all.

4. "Quarantine will inevitably operate against a free resort by steam homewards, unless an arrangement can be made for the days occupied in the voyage from Alexandria to England, counting out of the quarantine. This is now done in the case of Queen's steamers, and passengers by them are subject to a reduced term of Quarantine. I left Alexandria in H.M.S. Blazer, in April last for Malta, which place we reached in five days, we got pratique on the 10th day of admission to the Lazaretto, making twenty-one in all.

"The Quarantine Harbour there admits of the restricted intercourse prescribed by the law, and which saves to the vessel and her passengers, the days already spent since leaving Alexandria. The Marseilles steamers are not so indulged, and have intercourse at Syra with a boat from Constantinople and Smyrna, which subjects them to full quarantine, beside the loss of time by the circuitous voyage they make from Egypt.

"The Bengal Steam Fund Committee having had at their disposal and use the records of the Post Office, through the kindness and consideration of Lord William Bentinck, obtained various authentic returns of the magnitude of the public correspondence at the Presidencies. The results have been given in the Calcutta Petitions, and in evidence before the Commons.

		Received.	Dispatched.
Letters—	Calcutta . .	98,189 . .	72,397
„	Madras . .	31,306 . .	40,614
„	Bombay . .	30,000 . .	24,000
„	Ceylon . .	6,000 . .	6,505
		165,495	143,516

"Every merchant in India knows however that it is the practice for agents to ships to have in their office letter-bags, of which the captains take charge, saving the senders of the letters inland postage. No rule of the Post Office prohibited this plan, and it was resorted to generally, and to a very considerable extent. I have seen a sack full of letters sent on board a favourite ship on her being cleared for sea—the Post Office books know nothing of this.

"The number of letters dispatched from Bombay by the steamers has steadily increased, under every disadvantage of uncertainty and enormous expence. Heavy mails have on more than one occasion been brought back, and detained for weeks, or sent eventually by the Cape. The value of these letters in a mercantile point of view, would not exceed waste paper.

"A single letter now sent from Calcutta through the agency of Waghorn, and by way of Marseilles, costs ten shillings before it is delivered in London—viz., 1 R. 15 in India, and 5s. 7d. in Europe.

"No conveyance for letters that is second to any other in point of celerity will of course maintain its ground. When the public becomes more familiar with the subject, the whole of the India correspondence will for the present go by way of Marseilles. The inconsiderable saving in postage will weigh with very few, and not at all with merchants. Ask any one who dissents from this opinion, what his situation would be on hearing of the

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[*] See Bell's Annual Reviews of the Commerce of Bengal.

Mr. B. Harding.

30th Nov. 1838.

loss of a ship in which he was interested, viâ Marseilles, and receiving the advice for Insurance, viâ Falmouth seven days afterwards.

"The Red Sea route is now superseding the Cape route as rapidly as the public can be made to understand its advantages, and the way to avail of them. Marseilles will in like manner supersede Falmouth.

"A detention of some days is occasioned by the rule, requiring letters with enclosures to be opened, fumigated, and resealed at Malta. The French mails are not smoked or opened.

"The revenue* from freight must be precarious. I believe it would be worth while calculating the saving of an expensive and inconvenient coal depôt at Suez, and other objectionable places that might be effected by filling up the entire stowage with coal, very high rates of freight will be demanded for the conveyance of coal to the upper part of the Red Sea. The navigation is tedious and dangerous, and at certain seasons ships cannot make out of the Red Sea till the monsoon changes. Capacious steamers would do well to take in a supply at Mocha or Aden, sufficient to take them to Suez and back." B. H.

Capt. Henderson

Captain ANDREW HENDERSON was examined as follows :—

Chairman.] Have you been accustomed to steam navigation in the Indian seas?

Yes.

What sized vessel did you command?

A vessel of 300 tons, and 120 horse-power.

For what purpose was that steam-boat used?

She was originally built for a tug vessel in the river Hooghly; she was at that time employed in towing a vessel from Bengal to China that was towing up against the north-eastern monsoon.

At what time was that?

That was in April, 1830; it was in April that we got in; we started in March.

Did you make the whole voyage from Calcutta to China?

Yes.

Were you towing the vessel the whole way?

With the exception of about two days; we got rather short of fuel, and our object was gained, and we cast her off, and steamed against the monsoon.

What was the average rate of speed?

After we cast her off we went against a double-reefed top-sail gale at the rate of five and a half knots an hour.

Major *Oliphant.*] What was the state of your vessel? was she dry, or was she washed over?

She was not washed over.

Chairman.] How many days did you run against this head wind?

I think altogether seventeen days, about 1600 miles; and after this gale of wind was over, we were becalmed two days without fuel.

You were becalmed when your fuel was expended?

Yes.

Mr. *Read.*] Do you recollect on what day you turned the vessel off?

It must have been about the thirteenth day, I suppose; we had towed her then about 1200 miles.

Chairman.] Did the vessel make much water during that time?

Not the least.

She did not open at all?

Not the least; she was Indian built.

Is that an advantage?

Yes; she was built of teak—built by myself.

Was she built purely for a tug vessel?

For a tug vessel; we went at a week's notice; she was not intended for a sea-going vessel.

Mr. *Read.*] Was the vessel that she was towing deeply loaded?

Yes; she was a ship of 400 tons, drawing sixteen feet.

Major *Turner.*] What do you think would be the average rate which you could make with one of the best steamers of 1500 tons and 400 horse-power, in making the worst part of the voyage in coming from Calcutta?

I should think at least five knots.

* Bullion and Merchandize.

Mr. G. F. Young.
30th Nov. 1838.

Mr. *Auber.*] Should you, as a practical gentleman thoroughly acquainted with steam navigation, and having devoted your attention a great deal to it, have the least hesitation in giving an opinion that a vessel of 1350 tons with 400 horse-power coming from Galle during the monsoon, and making her voyage to Suez, would do it at the rate of 200 miles in the twenty-four hours?

I think she would average 180 the whole way; she would not go above five knots at the height of the Monsoon, but she would go ten at other times, and she would average 180. She might run four or five days without meeting with a wind that would bring it down to nine knots.

Lieut. J. Finlayson.

LIEUTENANT JOHN FINLAYSON, R.N., was examined as follows:—

Chairman.] You have been in the command of steam-boats for some time?

Since the year 1824, that is, off and on. I have been concerned in steam since 1824; I command a steam-boat now.

Upon what station?

The vessel I command now is a vessel built purposely to bring a new patent engine into notice belonging to Messrs. John and Edward Hall, of Dartford, she is called, the Dartford.

What is her size?

She is nearly 300 tons; she is a small vessel.

What is the largest vessel you have ever commanded?

560, she was between Bristol and Cork.

How long were you upon that station?

From 1824 to the beginning of 1836.

Going regularly backwards and forwards?

The first three or four years we laid by the winter; we did not consider it safe to go in winter.

Where have you been the last two summers?

The last two summers I have been running between Liverpool and Beaumaris, and the summer before, between London and Penzance.

Have you ever made any winter passages?

Yes, across the Irish Channel several winters from Bristol to Cork.

In what years have you done this?

In 1827, 1828, 1829, 1830, 1834, and 1835.

You have encountered, of course, all kinds of weather, and sailed when the wind has been blowing dead in your teeth?

Yes, I have never stopped latterly.

What was your average speed with those gales of wind dead against you?

I have had it blowing so hard that the engine would not look at it at all; I have been obliged to put canvass to keep her head to the sea.

You have been in situations where the vessel could not face the wind?

Yes; and I have borne up and put into port.

Mr. *Larkins.*] Was she a small vessel?

Five hundred and sixty tons, and 240 horse-power. That was the last I had upon the Bristol station.

Chairman.] Did you put on all your steam at the time when you had this head wind?

I always had it on; and if I had had more, I should have made my passage, I have no doubt, with a little proper precaution in getting canvass on to the vessel, not exactly keeping her dead to the sea. In 1827 I commanded the Superb; she was 400 odd tons, with 120 horse-power. I sailed on the Wednesday with 87 of the Scotch Grey's horses on my deck. I did not arrive in Cork till Sunday afternoon. We had tremendous weather the whole of the time; so much so, that the sailors had to take care of the horses while the soldiers went down and gave themselves up for lost. But I found the only way I had was to keep her always head to sea; that was in February.

What head-way did you make then?

Very little indeed. I got at last under the lee of the land, and I got into smooth water; but it blew so hard, that when I returned again the information was at Bristol that I was lost—some one had seen me go down and seen horses swimming.

loss of a ship in which he was interested, viâ Marseilles, and receiving the advice for Insurance, viâ Falmouth, seven days afterwards. *Mr. B. Harding.* *30th Nov. 1838.*

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What is the largest vessel you have ever commanded?

560, she was between Bristol and Cork.

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Going regularly backwards and forwards?

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Where have you been the last two summers?

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Lieut. J. Finlayson.

30th Nov. 1838.

Have you ever been in the East Indies?

No.

Can you give any opinion about the monsoon- -what effect it would have?

No further than from what I have read.

Mr. *Larkins.*] Suppose at that time you had been in a steamer of 1500 tons, with 450 horse-power, do you think you would have made head-way against the wind.

No doubt of it. If I had had sufficient power, I should have been perfectly safe, and have made my passage in half the time.

Chairman.] If you had a five hundred ton vessel and two hundred and forty horse power, you had a greater proportion of power than if you had had a 1500 ton vessel and 450 horse-power?

No doubt of it; but there is another thing against my vessel, that we had a very full bow. When I first went to steamers I considered that a full bow would be a great advantage for a steamer; but it is quite the contrary, for afterwards we put a new bow to her as sharp as possible, and she made much finer passages, and weathered a gale of wind better.

Is she in existence now?

No, she is lost; she was called the Albion. The Killarney I served in the same way.

Captain *Barber.*] Did you ever see the Semiramis?

Yes; she was running between Waterford and Liverpool?

What sort of boat do you consider her to be?

Not a boat that would make fine weather; she was too crank.

Is the engine which you are now using worked with a beam or without a beam?

Without a beam.

What power is it?

110 horse.

What difference in the engine room is there between one with a crank, and an engine of the same power worked with a beam?

Seven feet five.

Would the difference be in the same proportion in a larger vessel?

Perhaps not, because there would be some alterations in the engine. We have only one air-pump, and another engine would have two air-pumps.

You have worked engines of all makers?

I have; the principal makers.

Have you had Maudslay and Field's?

Yes; and Scott and Sinclair's.

Have you had Fawcett and Preston's?

No.

Having worked those engines, and having worked this one which you are now working, to which do you give the preference?

I prefer this one, because there is so much less danger of accident; it reduces the different parts of the engine, and it is much lighter, and takes much less room.

Is it simpler in its construction?

Much more so.

So that a nautical man can make himself acquainted with it without becoming an engineer?

Yes; in four hours, I should think.

How long have you had it in work?

Off and on nearly two years.

Have you seen Hall's patent Condensers used?

I have seen them; at least I went down in February last on board the Wilberforce to Hull and back again.

Do you approve of them?

Very much. I joined a Company in 1836, at Cork, and I was appointed

Lieut. J. Finlayson. 30th Nov. 1838. to superintend the building of two vessels, and I was sent over to England to get every information I could as regards the building of vessels and the price of Hall's Condensers.

At what rate do you think a properly built vessel of 1500 tons and 400 horse-power would go against a strong treble-reefed topsail breeze?

I should say from seven to eight miles an hour, a vessel of that description. I have been going four and a half when I met the American Liners in the St. George's Channel, with close reefed topsails, the vessel being light at that time.

Mr. *Read.*] What vessel was that?

560 tons.

Captain *Nairne.*] You have been across the Atlantic several times?

I have.

Have you ever been in the North Sea?

I have, many years ago.

Do you think that the sea in the Irish Channel is fully as high in gales of wind as it is in the North Sea?

Perhaps not. In a south-west wind I should say it was. It depends upon which way the wind is. When the wind is away to the northward, there is the land of the Irish coast. There generally is a nasty short sea there in the tide-way.

Captain *Barber.*] You have stated that you went four knots and a half in a vessel of 560 tons, when the American Liners were under close-reefed topsails. Will you state what you consider would have been the rate of speed in a vessel of 1500 tons and 450 horse-power?

I should say two knots more an hour.

Chairman.] Do you know what has been the average rate of speed of the Great Western, with a head-wind?

I do not recollect at this moment.

Mr. *Small.*] You have had no experience of a vessel of 1500 tons?

No.

Then on what ground do you found the conjecture that she would go two knots an hour faster than the smaller one?

I think, in bad weather the speed is increased more in proportion to the power in a large vessel than in a small one. I have been going down the Bristol Channel, and a small vessel only half the size has been coming up alongside of me, but in bad weather, the moment it began to blow hard we used to leave her behind.

Chairman.] What was your consumption of coal per horse, per hour?

A good deal depends upon the formation of the boiler. I have had it down as low as 9 lbs. and up as high as 12 or 14 lbs.

Have you ever had it as low as seven?

No, not the vessel I have had.

You say that you have had it as low as nine. What should you consider to be the average?

A good deal depends upon the formation of the boiler and the power that you have.

What should you say is your own average in your own experience, in your last vessel?

We expend a good deal of coal there because the boilers are not upon the principle upon which they ought to be to decrease the expenditure of coal.

Mr. *Auber.*] Do you work expansively?

No.

Captain Barber.] What is the consumption per horse-power of the engines you have now been trying the last two years?

It is about 11 lbs. per horse-power. It is owing to the construction of the boilers. The average of the Great Western is nearly 7 lbs. per horse-power. I know that because I have calculated it.

Chairman.] Have you any experience of iron steam-boats?

No.

Lieut. J. Finlayson.

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You know nothing about them?

Nothing more than what I have seen in looking about to see what is going on.

Have you any opinion upon the subject of iron steam-boats?

I think they will very shortly come into general practice. I have no doubt of it.

Do you think they will supersede wood?

I think they will.

For small or large steamers?

Both large and small. There are several ones now afloat.

Have you ever seen the Rainbow?

I have not been on board of her. I have seen her afloat almost every week. They are very tenacious of letting people go aboard that understand about steam-boats.

Capt. Nairne.

CAPTAIN NAIRNE, a Member of the Committee was examined as follows:—

Major *Oliphant.*] How far to the southward does the influence of the south-west Monsoon extend?

That varies according to the different months.

From June to the end of August?

In June, July, and August, you get the south-west Monsoon upon the Line. I should say that when the Monsoon has fairly set in throughout the Bay, in June, July, and August, you would get it upon the Line blowing moderately, and then it is generally more to the southward. In coming up with a north-east wind, you change as you get towards the Line from east to east south-east, and south, just coming round till you are beyond the Line, with a south south-west and south-west.

(Adjourned.)

Thursday, 6th December, 1838.

PRESENT.

Mr. Larkins.
Mr. P. Auber.
Major Oliphant.
Mr. Alderman Pirie.
Major Turner.
Mr. Read.
Mr. John Small.
Mr. Mackillop.
Mr. Thurburn.
Mr. Gouger.
Captain Nairne.
Mr. Pelly.

T. A. CURTIS, Esq., in the Chair.

A Letter, addressed by Mr. Holmes to the Committee, was delivered in and read.

Mr. G. F. Young.

6th Dec. 1838.

GEORGE FREDERICK YOUNG, Esq.; was examined as follows:—

Chairman.] You are a ship-builder?

I am.

Have you built many Steam-ships?

Yes: a considerable number.

How many have you built?

I think fifteen or sixteen.

Of various burden?

Of various burthen.

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What is the lowest?

One for the Trinity Corporation, employed by them as a yacht, 240 tons, I think, or thereabouts, the builder's measurement; I do not know her registered tonnage.

What power is she?

I think she has a pair of 35-horse engines.

What was the largest Steamer you ever built?

The British Queen; the largest, I believe, ever built.

What is her tonnage?

1860 tons.

And her power?

500 horse. I am now engaged in building another, of the same tonnage, and nearly of the same dimensions.

Have you ever turned your attention to Iron Steam boats?

Not in any degree that would justify me in expressing an opinion upon the relative merits of wood or iron ships. I am merely incidentally acquainted with the facts connected with them from occasional communication with those who have directed their attention to that subject.

Do you think there is sufficient experience to show that iron is equal to, or superior, or inferior to wood?

I think there is sufficient experience to justify the conclusion, that iron vessels for River Navigation possess very important advantages; but I think it is not yet satisfactorily demonstrated that they are equally well adapted with ships constructed of wood for encountering violent seas.

What do you think would be the effect, in an iron boat, of encountering a violent sea?

I have myself considerable doubts of the sufficiency of the strength that could be applied to an iron vessel when placed in the position in which a ship must be in a heavy sea. But I repeat that on that subject I do not attach myself great importance.to my own opinion, inasmuch as it is only formed on partial premises; and I am quite ready to change that opinion if further acquaintance with the subject should induce me to feel that it is not well founded. Also with respect to the application of iron for sea-going vessels, I have great doubts myself of the effect of salt water upon the iron. I think that the tendency to decomposition of the iron, from the action of the muriatic acid that is in the salt water, has not been sufficiently attended to; and I myself think that the corrosive effects that will take place will be likely to decompose the iron more rapidly than those who are favourable to its employment imagine it would. Thus far I am not acquainted with any means by which that effect may be conclusively obviated by any covering that can be put upon the iron. I know there have been a great many attempts; but, so far as I am aware, that has not been satisfactorily attained.

Is it within your knowledge that any effect of that kind has been produced upon the Rainbow?

I think she has not been employed a sufficient length of time to allow of that being fairly tested; and I am not aware that she has undergone any examination for the purpose of ascertaining the extent to which that action has taken place, even if the time had allowed of it being a fair experiment.

Does your remark apply to vessels lying in still water, or in the course of sailing?

My remark went to vessels lying in still water; but there can be no doubt in my mind that the decomposition would be more rapid when sailing, inasmuch as the oxidation, that would continually take place on the surface of the vessel, would be worn off by the friction of the water, and a new surface exposed to fresh oxidation.

That is always supposing that oxidation would take place?

Yes: of which I myself have no doubt.

What would be the draught of water of the British Queen?

The British Queen when launched was 9 feet 6 inches upon an even keel. I calculated that she would draw 9 feet 5 inches before she was floated, and she proved to be within one inch of that, but with 100 tons of weight put in as a

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precaution, in order to insure her stability; which proved to be unnecessary, but it was a precaution that I thought only prudent.

What will she draw when she has her engines and her masts in?

The estimated draught of water, with the engines, boilers, water, 500 tons of coals, 500 tons of cargo, and all stores, is 15 feet six inches.

What would a vessel of 1500 tons draw?

The draught of water is so entirely dependent upon the form of the body, that it is difficult to give a direct answer to a question having reference merely to tonnage. The draught of water may be reduced to almost any amount by increasing the displacement by the fulness of the lines. A vessel in proportion to her sharpness will immerse herself more deeply in the water with the same displacement.

With respect to the speed of steam-boats, do you calculate that with an increased tonnage you may have a proportionately decreased power of steam. For instance, taking a 500 ton vessel which had a certain power, if you then took a 750 ton vessel would you halve the power again?

I would not, certainly: opinions, I know, vary upon that subject; my own is, that with one single exception, which I am ready to state, the advantage resulting from increase of power is considerably over-rated—that exception being that of a steam-ship having to contend against a continued head sea, when nothing but great power will enable them to accomplish the object they have in view. But in the average of passages I think, myself, that there is an actual loss of entire speed from applying so great a proportion of power to tonnage as is now generally done; because the vessel is immersed more deeply in the water by the weight of the engines and appurtenances consequent upon the increased power, and the consumption of coals is also greatly increased; and hence, the vessel being more deeply immersed, the resistance is increased in so great a degree as to have the advantage on the part of the increased power very trifling, while the increase of expense is enormous. I am, therefore, upon the whole, not myself so favourable to the large proportion of power to tonnage which it is now the custom very generally to give.

Then in any vessel you would, probably, wish to have a reserved power. For instance, suppose you had a vessel that had 500 horse-power, ordinarily you would use 400 horse-power, but when it came on to blow hard continuously, you would put on the other 100 horse-power?

No, that is not the view I take. I consider that although in the particular circumstances I have stated of having to contend against a head sea, a large power would be eminently advantageous; yet, that taking the average of periods and of voyages, that advantage would be only occasionally found to exist, while the disadvantage to which I have adverted, would be one of continual operation.

That is to say, the additional weight of the other 100 horse-power?

Yes.

Mr. *Auber*.] Should you consider 400 horse-power to a vessel of 1350 or 1400 tons, a good proportion?

I have never met with that question reasoned precisely as it occurs to my own mind. I do not think that it is a question of proportion of power to tonnage. I do not think that tonnage will at all times afford an unequivocal test of the resistance. The resistance will be chiefly as the sectional area of the midship body of the vessel, modified by the form given to the vessel in other respects.

Taking the best form you could suggest, should you consider that the proportion of 400 horse-power to a ship of 1350 or 1400 tons, is a good proportion?

I intended to explain to the Committee, that my view is, that it should not be in reference to the tonnage of the vessel, because the sectional area of the resistance may be in two vessels precisely the same, while from the form, the dimension of tonnage may be very different indeed. Thus, an increase of breadth increases the tonnage considerably more than an increase of length, and you may increase the breadth, and by so doing increase the tonnage, while you might absolutely so construct a vessel, as that with that increased tonnage, the displacement of the vessel would be less. The sectional area, therefore, the greatest area of resistance, will absolutely be diminished, while the tonnage would be decreased, and hence, if you take tonnage as the test upon which you calculate the account of the resistance, and therefore, what power you require to overcome the resistance, you are arguing upon fallacious premises.

Taking such form of vessel as you consider the best in constructing a vessel of 1400 tons, what power would you apply to her?

For a well-constructed ship of that tonnage, I think that one-fourth of that tonnage, or 350 horse-power, would be the maximum that I would apply, with this sole exception, that for instance, I do not know that that is the maximum if the object to be attained was simply to encounter the south-west Monsoon in passing from Bombay to the Red Sea. In that case I think I should be inclined to increase the power, but I think it would be increased to a disadvantage to the ship under all other circumstances except that which I have named.

Chairman.] Taking the question as Mr. Auber has put it to you, taking your own lines altogether for the construction of a ship of 750 tons, what power would you have for her under the same circumstances, looking forward to a south-west monsoon?

From 220 to 240 horse-power.

Mr. *Auber.*] Did you know the Semiramis?

No, I have merely seen her.

Chairman.] Or the Berenice?

I never saw either of them in dock, therefore I can only judge from their external appearance; nor did I minutely examine either one or the other.

Mr. *Thurburn.*] Have you any practical experience of a south-west monsoon?

None whatever.

Have you formed any idea as to the class of ship you would construct most suitable to overcome that wind?

Yes; I have. My own opinion is, that taking into consideration all the circumstances and the difficulties that are to be encountered, a ship not exceeding 1000 tons would offer every advantage that could be obtained by a larger ship; while I think it would be advisable to go nearly as high as that tonnage for this especial reason. I think a large and heavy ship is much more fitted to encounter heavy seas from the advantage acquired by the momentum given to the body which a small vessel when exposed to the shock of a head sea would not be able to encounter. I think it would be absolutely driven back, although you were propelling her with the same power proportionate to the resistance; yet when exposed to the shock of such seas as have to be encountered there, a small vessel would be quite unequal to encountering the shock; and we know also that the momentum to which I have referred is a cause of accelerated speed in large ships.

Chairman.] You think a vessel of 750 tons to encounter that, would not be of sufficient size?

I should think it would be advisable to go beyond that.

You think that if they had 1000 tons, or a little above it, they might encounter the monsoon?

I really give that opinion with very unaffected deference, because not being a nautical man, and not having had practical experience at sea, I feel that I should give an opinion upon such a subject with great deference; but subject to that remark, I myself, from all I have read and all I have heard on the subject, am inclined to think that it may be successfully encountered: indeed, I have no doubt upon the question.

Mr. *Larkins.*] Are you to be understood to say that you think a steamer of 1000 tons is as equal to contend against a south-west monsoon as one of 1500 tons?

I am disposed to think she would be.

Mr. *Auber.*] What horse-power would you give to a steamer of 1000 tons?

About 300 horse, I should think.

Chairman.] How many passengers do you think in a vessel of 1500 tons, making the cabins ten feet by seven, you could well accommodate, leaving proper room for the coals and machinery, and so on?

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The mode of fitting up ships for passengers varies so very greatly that I feel a difficulty in giving a reply to that question. It would depend upon whether it was intended to have separate cabins or not. It occurs to me that the question could only be satisfactorily answered as to how many cabins of certain dimensions could be provided, leaving the question of their appropriation as to the number of passengers, to depend upon circumstances that might arise. I am scarcely prepared, without dimensions, to say the relative proportions of length and breadth that would give about 1500 tons.

Mr. *Alderman Pirie.*] Are the cabins of the British Queen fitted?

Yes; but our great object in the construction of the British Queen in making her so large, was that of giving her sufficient height to enable the construction of a range of bed-places, or what may be termed the Orlop deck, enabling the admission of light and air into those lower cabins from above the water. That, however, it must be admitted, is even in that ship but imperfectly attained; and in the ship we are now constructing for the same trade, it is intended that a poop and forecastle shall be built, which it is expected will give the same accommodation which in the British Queen is obtained in the 'tween decks, while the whole range of the 'tween decks below being brought a story higher, the cabins in that ship will be both light and airy. I could hardly give an opinion as to the number of cabins, unless upon dimensions; but nothing could be easier than to determine at once with sufficient accuracy what should be the length and breadth of a ship of 1500 tons, and to take from that the length that would be required for the engine-rooms; and the rest of the space being appropriable for cabins, it would at once be seen what number of cabins could be placed in them; and if it would at all further the objects of the Committee I would undertake to give an opinion upon that subject when I have looked into it. I shall be happy to give that information.

Chairman.] What space would you require for the engines and all the apparatus?

Engineers differ very much indeed in that respect. When we were building the British Queen the engine-room was at first set out 102 feet in length; but in consequence of the failure of the engineers who had undertaken to manufacture the engines, and the employment of another engineer, he at once so altered the construction of his engines and the placing of his boilers as to contract the engine room to eighty-seven feet in length, taking off at once fifteen feet from the length of the engine-room, and throwing it into the most valuable part of the ship, with a capability of appropriation to other purposes.

Mr. *Auber.*] Who is the engineer that is constructing them?

Robert Napier, of Glasgow.

Major *Turner.*] What would be the expense of a 1500 ton wooden steam ship of the best kind, including everything but her engines?

I should think that a wooden ship of that tonnage properly constructed and built in the best manner, sufficiently provided with all requisite stores, and handsomely but not extravagantly fitted, might be produced for about 37,500*l.*, exclusive of the engines; that would be 25*l.* a ton.

Would that same cost be applicable to vessels of smaller tonnage, for example, to a vessel of 1350?

Yes, unless the class of ship were altered; it might suffice for any amount between 1000 and 1500 tons. Of course all such questions are very much affected by the detail of the arrangement, and I must be understood as referring to an average calculation.

Mr. *Read.*] Can you give the Committee any idea of what the expense of a 350 horse-power engine would be with iron boilers, and with Hall's condensers?

With respect to Hall's condensers, I am not very well prepared to state the expense, but I should think it would be about £17,500.

Chairman.] Does that include Hall's condensers?

No, I am not aware of the precise expense of that.

How many miles do you think a steam-boat would run in a year?

I believe it is considered by engineers to be a point of no inconsiderable importance that engines should not be kept too consecutively employed. I am not able, myself, to demonstrate the disadvantage resulting from it, but I am quite aware that most experienced engineers consider it a very great advantage that engines should not be kept perpetually at work—that there should be intervals even independently of the necessity that may arise for that for the purpose of cleaning and repairing. I scarcely, therefore, know how to say what number of miles might be run in the course of the year, the circumstances varying so much as to speed as to whether they are running in smooth water, or exposed to adverse winds, and whether they are occasionally laid bye, or whether they are not.

The question goes as to the number of boats to be employed upon certain stations, for instance, the station from Bristol or Southampton to Alexandria. We should have two boats, and they would each have a certain number of miles to go every year. The question is,—whether you think two boats will be sufficient to accomplish that number of miles, or whether it would require a third boat as an assistant?

I should think, without hesitation, it would be indispensable to have a third boat if you required a constant communication to be kept up.

You are aware that there would be always an interval of thirteen or fourteen days between the arrival and the re-sailing?

I think, notwithstanding that, ordinary prudence would prescribe that where an important line of communication was expected to be maintained, even with those intervals a vessel ought to be in reserve, and I cannot doubt that it would be attended with great advantage that it should be so, and occasionally the interval of a trip might be allowed for more effectually overhauling the machinery than could take place when they were continually kept running. But those are points upon which it is more for an engineer than for a shipbuilder to express anything like a confident opinion. If I recollect right, I think the average rate performed by the whole of the government packets employed between Falmouth and the Mediterranean for a considerable period, was seven miles and a quarter an hour, while steaming, and five miles made up, including all stoppages. I speak now from recollection merely of the evidence given, I think, by Mr. Field, before the Committee of the House of Commons upon Steam Communication with India, of which I was a member, but that, of course, is accessible in a printed form to the Committee. That would give 120 miles a day, and that maintained continuously would give a much greater number of miles than that now stated. But it is not to be supposed that a vessel could be continually running without intermission. Therefore from that amount should be deducted any number of days that it might be considered essential that the vessels should lie bye.

Can you state what would be the weight of a wooden vessel of 1500 tons?

I should think a vessel of 1500 tons properly constructed would weigh about 700 tons.

If it were the case that an iron vessel of 1500 tons were only to weigh 500 tons, of course, putting the same power upon her, the speed would be greatly increased?

Supposing the form to be the same, I should calculate that a difference of 200 tons in the weight of the vessel, would cause a diminution in the draught of water of about fifteen inches, and that would of course considerably diminish the sectional area of the resistance, and therefore there would be greater speed.

Supposing that in such a case there was to be an iron vessel which only did weigh that quantity of tons, would you put in the same engine-power?

For the reasons I have before stated I should not, but there can be no question that if you keep the power the same, with a diminished resistance you might calculate on increased speed. But I still think that you would obtain that increased speed at a greatly increased cost, and that there would not be so great an addition to the speed as to justify that cost. It appears to me that the reasoning is the same whether applied to a vessel of 700 tons weight, or of 500 tons.

Have you turned your attention at all to Steam Communication with India beyond having been on that Committee of the House of Commons, which sat upon the subject?

Yes, it is a subject with which I have been familiar many years.

Have you made up your mind to any plan as likely to be feasible?

I was always myself, upon the whole, strongly in favor of steam communi-

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cation by the Cape of Good Hope, but that founded chiefly on this consideration, that the route by Egypt was one which political circumstances might interrupt, and that broken as it must be by the necessity for part of it being performed by land, it was not so well adapted for personal conveyance. But there can be no doubt that rapidity of communication is much more effectually gained by that route than by the one which I refer to. I think, for the purpose of conveying passengers, therefore, to and from India permanently, steam communication by the Cape of Good Hope, would be highly desirable in a national point of view, but for rapidity of communication while that communication can be kept open, the route by Egypt has unquestionable advantages.

Supposing those advantages to be permanent, and supposing that they should not be affected by political circumstances, have you turned your mind to consider any way in which you would carry out a plan of that kind?

Yes, I have looked into the details of the question, but it is now some considerable time since, and I should fear to trust my recollection as to any minute detail, but I am prepared to answer any general question.

Should you think a vessel of 1500 tons would be the best sized vessel to go, taking it throughout, and taking the supposition that as you cross the desert having vessels on the other side exactly corresponding, you would have corresponding packages, and so on for the conveyance of baggage and various things?

I certainly think that 1500 tons would be unnecessarily large; and as it is impossible to dissever in my mind such a question from the consideration of expense, unless the advantages were very palpable and great, then the increase of expenditure caused by the employment of ships of such large burden would not be expedient.

What sized vessel should you suppose would be the best size to employ for the communication from Calcutta to the Red Sea, and from this country to Alexandria?

I should doubt the expediency of having the same sized vessels for both purposes. I should think that the communication from Alexandria to England would be more advantageously carried on in a smaller description of vessel than it would be expedient to employ between India and Egypt.

Why?

I have already stated that the seas they would have to encounter in coming from India would be more advantageously encountered by a ship of large size; while the same inducement does not exist in reference to the navigation of the Mediterranean or the intervening sea.

But, setting aside the question of navigation in respect to the passengers that are coming from India or going to India, do not you think that they require more accommodation than ordinary passengers; for instance, those that go to North America?

Yes; I should say certainly that they do. The habits of the parties likely to perform such a passage, and the climates which they would have to pass through, would seem to imply that it would be advisable that they should have a superior description of accommodation.

Would a vessel of 1000 tons afford that accommodation?

I think it would.

You say three boats for the Mediterranean. How many boats would be necessary to carry on the communication between Suez and Calcutta; taking the Point de Galle, for instance, as the first stoppage?

I should be sorry to evade answering the question; but I do not feel prepared to give an opinion upon that point. I do not like to trust my recollection as to preconceived opinions upon that; and I feel myself unable at the moment to carry out all the reasonings that would justify giving an opinion upon it. I should rather decline giving an opinion upon that, without more reflection.

Do you think that vessels of 1500 tons would be most desirable from Suez to Calcutta?

I think that vessels of 1000 tons would be sufficient. If expense were no object, I have no doubt there would be some advantages in increasing the size of the ship; but I think that a vessel of 1000 tons would answer all the object.

You were understood to say that you would have vessels of a smaller size from Alexandria to England. Would you have vessels of less than 1000 tons?

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Yes; I do not see the necessity of having vessels so large as that. You might have vessels between Alexandria and England of a different construction from that which I think it would be advisable to have between India and Egypt. The construction which, as it appears to me, would best accomplish the object to which the questions point—that of accommodating the largest number of passengers commodiously—would be for the Mediterranean to have poop ships; but I have great doubts whether that would be expedient for vessels intended to encounter the south-west monsoons. Now with a poop you might get a greatly increased accommodation for passengers in a small vessel. The limit of size there would be, as it would appear to me, that the vessel should be sufficiently large to have height above the water for admitting a range of ports along the between-decks. When you have gained that point, I fail to perceive myself what would be the advantage, in the communication between Alexandria and England, in still further increasing the size of the ship.

You think that having a poop would afford all the accommodation that the East India people would require?

I think it would. You would have the poop accommodation, and a range of accommodation below it also, both commodious and airy. Now you cannot have both in a ship that is flush, and therefore you cannot accommodate the same number of passengers on one range of deck so commodiously that you could if you had a second, unless the other ship was much larger.

It has been stated that the south-west monsoon is not more violent than the weather that is met with in the Atlantic?

I confess that I entertain the opinion, founded of course simply upon the information one picks up on these questions, that it is more violent.

Captain Henderson has stated that it is not more violent than the weather that is sometimes met with in the Channel.

The difference is, that you may have to encounter a gale of wind in the Atlantic; but that violent wind which you meet with in encountering the south-west monsoon is continuous, and I should have imagined, but that I say only from hearsay evidence, that the very fact of the continuous blowing of the wind in one direction must keep up the sea to a great height.

You are aware that the Great Western went out in nineteen days and a half, with a head wind against her the whole way out. Do you think that having a poop vessel, which is to encounter the south-west monsoon, supposing the south-west monsoon is not worse than our Channel winds or the gales you encounter in the Atlantic, there would be more danger in going from Suez to Bengal than there is in going from Bristol to New York?

I do not call the Great Western a poop ship. The vessel I propose would be 1800 tons, and it is that which enables the application of the poop.

You would not run a smaller vessel with a poop?

It would not be so admissible.

None of the American packets have poops?

No. They are all flush ships: the passengers are accommodated below.

Captain *Nairne.*] What size is the Isabella?

Five hundred and sixty tons. I am one of those who always thought the navigation of the Atlantic by steam practicable; and, in order to bear out my convictions, having no interest whatever in the Company, I took an interest in the charter of the Sirius, the first ship that accomplished it, with the calculation of a loss of 1000*l.* upon the voyage, which proved ultimately to be more. I cheerfully consented to pay my proportion of the loss in order to demonstrate the practicability of it; of which I had never entertained the slightest doubt whatever.

Captain *Henderson* put in the following paper:—

"With respect to the much-talked of difficulty of making a passage against the S. W. monsoon. There can be no doubt that the "Semiramis," would have accomplished it if she had taken her departure from Point de Galle instead of Bombay July last.

"Little information can be got of the strength of the monsoon in the track from Bombay to the Red Sea *from actual observation*, from there being no trade or object to induce any one to attempt that passage in sailing ships; but I think there is every reason to believe that the same weather may be expected in that track, as there is found in the N.E. or lee-side of the Bay of Bengal and China Sea, at that season; and if I may judge from twenty years' experience in sailing those seas, I should generalize by saying its being

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a double reefed topsail breeze, and in June, July and August, subject to sudden hard gales, with a heavy sea and cloudy weather, caused by the interruption of the course of the monsoon by the Andamans, and coast of Arracan in the Bay of Bengal, and the coast of Lucoma in China Sea; at the same season we find a steadier breeze and fairer weather on the western or weather shore; in which track all ships endeavour to keep straight with to make a passage against the monsoon. The passage from China to Singapore, which was rarely attempted twenty years ago, is now accomplished in twenty or twenty-five days. From the above, and from information derived from those who have frequented the Bombay side of India, I think the same rule would be found to answer there; and that, if instead of starting from Bombay through the track of the severest weather, they were to start from Ceylon, they would find the same kind of weather, and have the advantage of being so far to windward in case of accident.

"To prove the practicability of this route, a subscription was entered into in Calcutta, to despatch the "Forbes," for Suez. She was obliged to put back from Madras, in consequence of having burnt her boiler; and after two months detention did make the passage round Ceylon to Suez, although from her want of capacity she was obliged to tow a vessel loaded with coal some days from Ceylon, to enable her to reach Mocha. Her capacity was very small, as although only 302 tons she had 120 horse-power, or, 2½ tons per horse-power.

"With such a vessel as 2000 tons and 550 horse-power, I feel confident the passage would be easily accomplished in from 20 to 22 steaming days from Calcutta to Suez, which allowing two days for detention at Madras and Point de Galle, would still be seven days quicker than Calcutta *letters ever* reached Suez viâ Bombay."

(Adjourned.)

Friday, 14*th December*, 1838.

PRESENT.

Mr. P. Auber.	Captain Nairne.
Mr. C. Read.	Mr. Stewart.
Mr. MacKillop.	Mr. Larkins.
Mr. Bagshaw.	Mr. Gouger.
Mr. John Small.	Major Turner.
Major Oliphant.	

T. A. CURTIS, Esq., in the Chair.

Captain *Barber* further examined.

Capt. J. Barber.

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Mr. *Bagshaw.*] In Mr. Secretary Melvill's letter of 15th September last to Lord William Bentinck, it is stated as an objection to the establishment of a private Company, that "Having so recently undertaken, conjointly with the Government, the conveyance of the public mails in preference to *that important trust being committed to a private association,* the Court are of opinion that the *principle* of that arrangement should be maintained, at least until it has had a fair and complete trial, in point both of efficiency and expense." Will you be good enough to state to the Committee whether any deviation has taken place in the principle of the arrangement mentioned, and in what instances within your knowledge has the "arrangement" proved inefficient?

It appears to me the East India Company through their organ, Mr. Secretary Melvill, have contended for a "principle" at variance with their daily practice. It is a well-known fact, that since the peace, *i. e.* for more than twenty years past, private ships have been the constant medium of conveying their despatches to and from India. I myself have received many sums at various times for the performance of that duty. At this present moment the Queen's and Company's despatches, with the public mails, are conveyed to Gibraltar, *en route*, to India by the *Peninsular Steam Navigation Company.* At times through France, and from Marseilles to Egypt by a *private French Company.* Direct from Falmouth they are under charge, first of the Peninsular Steam Company, then Her Majesty's Packet to Malta; again transhipped there for Alexandria; there received by another agent; embarked at Suez; and, when landed at

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Bombay, conveyed in the rainy season, at considerable risk, to Madras and Calcutta. A large portion of the mails of July and August last arrived in Calcutta in so mutilated a state as to be hardly legible. It surely will not be denied the risk must be materially lessened if confided to *one agency throughout* the line, subject only to the removal from a vessel at Alexandria to a vessel at Suez before they arrive at their several places of destination; added to which, for passengers or parcels to be conveyed from Bombay to Calcutta from the middle of May to the middle of September, is impracticable.

As regards the inefficiency of the present scheme, it has been recently proved by the arrival of three months' despatches at the same time; shewing that for two consecutive months' the steamers failed, being of inadequate size and power. This caused considerable individual loss, for news of the wreck of the ship "Duke of Northumberland" off the Cape arrived by sea, and the orders for insurance of goods by that ship, overland, days after, which might have been, under proper arrangement, in London two months previously. Then again, the East India Company's vessels are always liable to be employed for state purposes, for which the vessels they now have in commission and those they are building are not more than adequate to perform. Their present inefficiency may also be gathered from this fact:—

A family at Hyderabad desirous of coming to England *viâ* Egypt, and having a land journey of nearly 400 miles to perform before they could reach Bombay, took the precaution to apply (by letter) for accommodation in a steamer four months in advance; they could, however, obtain no definite answer, and left Hyderabad on their journey in doubt. At the end of the fifth month from their first application for accommodation they embarked, but without being able to obtain any specific answer from the superintendent of marine as to the accommodation appropriated for them till the very day of embarkation. The party consisted of a lady and gentleman, an infant, three children, four, five, and six years of age; European nurse, and a man-servant. Thus charged:

	Rupees.
Passage to Suez or Casseir, for each adult	800
For each child not in arms	400
European attendant, for whom no sleeping accommodation was provided, and who had her meals with the servants	400
Man-servant, for whom there was no accommodation but the deck	40

In this vessel each cabin was for two persons; neither beds or bedding provided.

It will be seen this party paid as much to reach Egypt from Bombay as I have estimated to charge from Bombay throughout the line to England.

Then from your answer the Committee are to understand it to be your opinion that the joint scheme of the Court of Directors, and Her Majesty's government, for the conveyance of the mails, "has had the complete trial" alluded to, and that it has failed in efficiency?"

I am decidedly of that opinion.

As agent to the Indian Steam Committee you receive the correspondence of that body. Is it your opinion from that correspondence, that the scheme propounded by you is of that character as will be likely to ensure the full co-operation of the Committee, and the subscribers of the £140,000 fund?

I should have been guilty of a dereliction of my duty if I had not thought so when I propounded it, and I would further observe, £130,000 of that fund is subscribed for in Bengal alone, to support any well-organized plan of communication by the *Red Sea*, and I am convinced that when it shall be made known in India that British merchants have at last responded to their reiterated supplications, that a very active principle of co-operation will be found in the community of India, Ceylon, and China.

I think you stated as one reason why you recommended vessels of as large a size as 1500 tons, was, that in the event of any political changes occurring by which the passage through India might be interrupted, they would at once be applicable to the route *viâ* the Cape, when smaller sized vessels would not?

I did so, and from the evidence that has since been placed before this Committee by the most competent witnesses, I am confirmed in that opinion, and would rather increase than diminish the size.

Have you formed any calculation of the number of persons who travel by

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Dawk, or otherwise, from Bengal, Madras, and the Coromandel coast to Bombay, or the coast of Malabar, that would go by steamers had they the opportunity?

The number of passengers from the Presidencies to the coasts of Coromandel and Malabar, for the purpose of getting to their several stations contiguous to their place of landing, as well as for commerce, are very great; all of whom would, of course, materially benefit by the plan of steam communication that I have recommended.

In the course of examinations of witnesses before this Committee I have noticed that very much stress has been laid upon the difficulties the steamers would have to encounter from the south-west Monsoon. As a practical seaman, and much acquainted with the navigation of the Indian seas, both from your own experience and what you have gathered from others, particularly from the evidence taken before the Parliamentary Committees of 1834 and 1837; I should be glad if you would in as concise a manner as possible, inform the Committee the course that in the south-west Monsoon you would recommend for a steam-ship to take, having to touch at Madras and Galle on her voyage to the Red Sea. We all remember it having been proved in evidence, that the south-west Monsoon never blows what is termed "home" on the Coromandel coast?

The more I examine the question the more I am convinced that to vessels of the size and power I have named, the south-west Monsoon is by no means an insurmountable obstacle. From Calcutta to Dundra Head would be a smooth water passage; round the Head to Galle there would be a nasty sea at times to contend with; from Galle, after the fourth day's steaming, a fair wind might generally be made to the mouth of the Red Sea. The "Great Western" on her last voyage outward was reported to have been seen by a vessel that arrived in England, steaming a-head against a gale which compelled the vessel to run under close-reefed main-top sail and foresail. The south-west Monsoon is at most a double-reefed top-sail breeze by the wind. To any sailor this would be conclusive.

I believe it has come out in evidence before this Committee that the two companies which own respectively the "British Queen" and the "Great Western," being so sensible of the advantages to be derived from the employment of larger vessels than either of the two named, are now each building steam-ships of even larger capacity and size than those recommended in your scheme?

They are doing so.

Can you inform the Committee the size of any iron steam-ships that have been ordered for the Atlantic navigation?

One at Liverpool of 1200 tons for the London American Company, and one of 2000 tons and upwards at Bristol for the American Steam Company of that port.

Perceiving that Aden has been lately talked of by the government of Bombay, I would beg to ask whether that port is one adapted for a coal depôt?

I know nothing of Aden. Lieut. Wellstead reports it in evidence to have two good harbours. In the south-west Monsoon its geographical position is decidedly against it for a depôt, and at any time it will lengthen the distance for the Calcutta boat. If 1500 ton vessels are used, no depôt of coals would be necessary between Galle and Suez, though it would be prudent to have a small one, particularly in the south-west Monsoon. I am inclined to think, Perim would, under all circumstances, be the best station for a floating depôt.

If it should be decided not to prosecute the plan to the eastward, you would, I presume, recommend branch steamers being stationed at Bombay to carry passengers in the north-east Monsoon direct to the Red Sea, and in the S.W. to Galle, there to meet the steam-ship from Calcutta?

Yes.

How many days are at present occupied in conveying letters from London to Alexandria by the way of Marseilles or Trieste?

Twenty by Marseilles, nineteen by Trieste, but they are by no means to be depended upon.

How many direct from London by the steamers as now arranged and employed?

Twenty-six in ordinary weather, thirty in some of the winter months.

How many days would it take by the steamers proposed in your plan, from London to Alexandria?

Sixteen in ordinary weather, and eighteen or nineteen in some of the winter months.

The *Chairman* put in the following Plan: viz.

Steam Communication with India viâ the Red Sea.

Chairman's Opinion.

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"Adopting the opinion which the best consideration of the important subject enforces upon my mind, that, at least so long as it is practicable, the shortest route to India is the most eligible for the conveyance of letters and passengers, and bullion when required; and believing that the obstacles which have been supposed to exist to the passage of the Isthmus of Suez are phantoms which are without any real cause, I came to the conclusion that the Steam Communication with India would be most effectively, most certainly, and most economically established by way of Egypt and the Red Sea. To effect this object, I should propose that the different points to which the Steam Boats should be directed should be (taking the point of departure either at Southampton or Bristol) Alexandria, Suez, Aden, Bombay, Point de Galle, Madras, and Calcutta. In the present state of the Trade, I conceive the communication between Bombay and the Straits is not sufficient to pay the additional expense of a Steam Boat on purpose, or to incur the risk of accident and delay, by prolonging the distance of a Bombay boat to Singapore and Bombay, as proposed in Capt. Barber's plan. The size of the boats I should adopt would be 1500 tons each for the communication between England and Alexandria, and between Suez and Calcutta, and 1000 tons between Aden and Bombay or Bombay and Point de Galle (as hereafter explained). I consider that to insure that regularity and expedition which are essential to the success of such an enterprise, it will be necessary to have three boats between England and Alexandria, and three boats between Suez and Calcutta; two boats will be sufficient for the service between Bombay and Aden, or Point de Galle. Taking Mr. G. F. Young's estimate of 25*l.* per ton for a timber vessel for sea, which would be for a vessel

of 1500 tons		£37,500
Engine, 500 horses' power		25,000
		£62,500
The cost of six boats would be		375,000
Add the cost of two boats of 1000 tons, each 25*l.*	£50,000	
Engines, 300 horses' power	30,000	
		80,000
		455,000
Add for contingencies		45,000
		500,000
And floating capital		100,000
		£600,000

"The application of the three boats between England and Alexandria need no particular remarks. They would of course take their alternate voyages, and ample opportunity would be afforded of overhauling them for examination and repairs, if necessary.

"The three boats to ply between Suez and Calcutta I propose to arrange thus, supposing the evidence the Committee has obtained that a trip of 3,000 miles is about as much as any steam-boat should be made to perform. The boat to Suez should touch at Aden, leave there the passengers, letters, &c. for Bombay, and then proceed to Point de Galle, where she should meet a boat from Calcutta, in which the passengers, letters, &c. would be shipped to Madras and Calcutta.

"The third boat should be stationed either at Calcutta, ready to take its turn, or at Point de Galle, as might from experience prove most desirable.

Chairman's Opinion.

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The distance between Galle and Calcutta being only 1400 miles, the same boat would go and return. In respect to the Bombay boats, I propose that, during eight months in the year, they should go from Bombay to Aden to meet the boat from Point de Galle for Suez; and that it should, during the same months, wait the arrival of the boat from Suez, at Aden; and that during the four months of the S.W. monsoon, the Bombay boat should proceed to Galle to meet the Calcutta boat to convey passengers to Suez, and so *vice versa;* during the monsoon, the Bombay boats would await the arrival of the Suez boat at Point de Galle, unless it might be thought practicable and advisable, as the monsoon would give a fair wind from Galle to Aden, that the boat should proceed under easy steam power, and sailing to Aden, to await the Suez boat, even during the monsoon. The time and distance saved to the Bombay passengers, would be thus very great; and it may deserve the consideration of those whose nautical knowledge enables them properly to judge of its practicability. In preparing this arrangement of the Bombay boats, I have assumed that Bombay will daily become a place of more importance, both in its trade and in its political position, and therefore merits peculiar consideration. It is the point of communication with the Indus, and all the northern parts of India, through which that majestic river flows; and it is the frontier which presents itself against any outward attack. It seems therefore neither reasonable nor just that the traffic and correspondence with that presidency should be subject to an increased distance of upwards of 1400 miles, which carrying passengers and letters at all times to Galle necessarily involves, and which, under most favourable circumstances, delays their arrival at Bombay at least seven days. I avoid all calculation of expenses and revenue, because I consider that though the one may be pretty nearly approximated, there is still much of speculation in it, and the other is wholly speculating; I adopt the broad and general principle that the object is one of national importance and of commercial interest, and that therefore if the enterprise is properly carried into effect, the Government, East India Company, and the public will avail themselves of it, and contribute to its success. Of that success I have no doubt; at the same time I do not think it would be prudent for the projectors of the plan to undertake it in the first instance without a distinct pledge from Government and the East India Company to support it by a handsome and sufficient contribution annually for a fixed period. But it must be borne in mind that no negociation, either with Government or the East India Company, will succeed, unless the party negociating is prepared to say that the plan is ready for execution, and to give the assurance that it shall be carried without interruption. In preparing boats of 1500 tons to run between England and Alexandria, and Suez and Calcutta, I have been actuated by the view of affording accommodation of an attractive character to those whose habits have accustomed them to more luxuries than the inhabitants of colder climates require, and have considered that with boats of less size with the advantage to a Company of a number of passengers, must be diminished by the necessary dimensions of the accommodation, or that the comfort of the passengers must be curtailed, either of which would be elements of failure to the enterprise. In taking 1000 tons for the Bombay boats, I have been guided mainly by the evidence afforded upon the force of the monsoon, and the general opinion that a vessel of that class is required to contend successfully against almost any sea that it can encounter; added to this I anticipate a great increase in the Bombay passengers when such vessels should be established. The ports of Southampton or Bristol I have adopted for the points of departure in preference to Falmouth, because, in the first place, there will shortly be a railroad completed to each of these towns, which will afford a rapid transmit to and from thence. And, secondly, because in both places there is good quarantine ground in smooth water, and acceptable for letters, newspapers, and other conveniencies from the shore. It is true that the channel navigation would be wholly saved at Falmouth, but the overland journey to and from that distance is very fatiguing, and there appears no corresponding advantage to be gained as a counterpoise to the inconvenience. In point of profit there is nothing to expect from Falmouth, whereas the proximity of Southampton to London, or the advantage of the enterprising spirit of the trade of Bristol, would offer to any Company a good prospect of profitable return. By the privileges afforded passengers, and the comparative cheapness of transmissions of treasure or baggage to the point of embarkation, adverting to the evidence given to the

Chairman's Opinion.

14th Dec. 1838.

Committee by Mr. Claxton, manager of the "Great Western" steam ship, if the Bristol people would take as large an interest in the Company to be formed for steam communication with India by the Red Sea as that gentleman thought probable, I should recommend Bristol as the port of "sea embarkation," and particularly if the quarantine ground is in smooth water, as I understand him to say, and still more so if the dock gates should admit steamers of the size contemplated, and port dues not be excessive. At present the Great Western steam ship lies at anchor in King's Road; but Mr. Claxton assured the Committee that the coals and passengers had never been stopped in their passage to and from the vessel. I have thus placed my plan before the Committee, not in the vain expectation of its being in any way superior to any other that has been submitted, but in the hope that something in it may be found worthy of attention, and from which possibly materials may be gleaned to amalgamate with the parts of other plans, and those form a whole which may be reasonably presented to the public as practicable, and having a fair prospect of success."

Resolution of the Committee.

The following resolution was moved and carried:—"That in the opinion of this Committee it is highly desirable that a Monthly Communication between the three Presidencies of India, Ceylon, and Great Britain by Steam-boats, and by the way of Alexandria, Suez, and the Red Sea, should be established, and that the same is perfectly practicable. That experience has shewn the means possessed by the East India Company to be insufficient and inadequate to afford certainty, even in the limited communication which is now confined to Bombay.

"That from the evidence before the Committee, the East India Company's means, present and prospective, do not warrant the expectation that they will be adequate to carry out communication with the three Presidencies and with the Island of Ceylon, and that were those means more ample the liability to require the steamers of the East India Company for political employ would render certainty in the more extended communication wholly impracticable.

"As in cases of military movements, or objects connected with the policy of Government, the service of the steam-boats of the East India Company is liable to be directed to these purposes,—the Commitee think it desirable that a Company should be formed for the purpose of establishing steam-boats to run between England, Alexandria, and Suez, and the three Presidencies of India and Ceylon, and that the despatch of such boats should be monthly, both from London and Calcutta.

"That a Sub-Committee be formed, consisting of the following gentlemen.

Major Oliphant	Peter Auber
Captain Nairne	Captain Henderson
J. P. Larkins	Alderman Pirie.

And of which Sub-Committee the Chairman and Deputy Chairman shall be *ex-officio* members, to consider and report to this Committee the plan which it may be most desirable to submit to the consideration of a Public Meeting.

APPENDIX.

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APPENDIX.

APPENDIX, No. I.

LETTER from Mr. *Samuel Hall* to the Committee.

Appendix, No. 1.

Letter from Mr. Samuel Hall.

Basford near Nottingham, October 19th, 1838.

Gentlemen,

In consequence of the impression of the meeting held at the Jerusalem Coffee House, on the subject of Steam Navigation to India *viâ* the Red Sea, that the undertaking would be attended with too much expense to remunerate the parties who might invest their capital in it; I take the liberty of stating, why that would not at this moment be the case, whatever it might have been during the state of the steam engine up to the present period: for I presume it is the enormous expense attending large marine engines, and the large portions of the vessels that they occupy, which form the apprehended excessive expense or stumbling-block to the great undertaking in question. With this view of the subject, I take the liberty of suggesting the propriety of your instituting a strict investigation of the present state of the steam engine, which I am certain will furnish you with data to reason and calculate upon, widely different to those supplied by all engines in operation up to the present period. A committee for this purpose was urgently pressed for in the House of Commons last spring, which (had it been granted) would have caused Lord William Bentinck to entertain at this moment a very different idea of the expense requisite for steam navigation to India *viâ* the Red Sea, to that which he expressed at the meeting above mentioned. Lord William Bentinck was a warm advocate for the Select Committee of the House of Commons, and many other highly respectable members, but unfortunately it was not obtained. I hope, therefore, that you, Gentlemen, will supply the loss as much as possible to the public by as full an investigation of this, among other parts of the subject as was contemplated by the meeting of 12th inst. It is by no means my wish to limit the above investigation to what I have to submit to you, but I fearlessly engage that my quota of improvement in steam navigation, and consequent economy, shall be such as to render an undertaking amply profitable, which would not, otherwise, yield prime cost. What I have to offer for your consideration I shall divide into two parts: the first, is my method of condensation and all its advantages as applied to the engines of 500 horse-power on board the British Queen, to a pair of engines on board Her Majesty's ship Megæra, and to fifteen or sixteen other large pairs of marine engines; and I may state that they are also now being applied to a pair of 560 horse engines for the President, and to a pair of 220 horse-power for the Hon. East India Company. The second part of what I have to submit to you, consists of a boiler upon new principles, for which I have recently taken out a patent, the effects of which you will on investigation find to be as follows; viz. a reduction of about one-half of the size and weight of the boiler and of the water it contains, also a diminution in about the same proportion of the consumption of fuel; and to these advantages are added a great increase in the strength, safety, and durability of the boiler; and I may remark, also, that all its parts are as accessible to clean or repair as those of the common boiler, and that it possesses no practical or other objection whatever. I now take the liberty of sending you a letter which I addressed to Lord William Bentinck in January last, and some documentary evidence respecting the importance of my first class of improvements on steam engines: the strongest testimonial, however, to their value consists in the following circumstance: Three of the Directors of the British and American Steam Navigation Company, viz. Mr. Pim, Mr. Twigg, and Mr. Beale, are also directors in the St. George Steam Packet Company, who have had four and a half years experience of the value of my improved engines as applied on board many of their large vessels; they have now, indeed, engines to the amount of nearly 2000 horse power in operation upon my principles. On the formation of the British and American Steam Navigation Company, a discussion took place between the Directors, respecting the adoption or non-adoption of my improved engines to their ships, when the above named three gentlemen declared that they should only join in the undertaking on the express condition that my improvements should be applied to all the engines of the Company's ships, and that if the Directors did not come to that determination, they should decline having any thing to do with the concern; for from the great advantages the St. George Steam Packet Company had derived from my improved engines, they were quite convinced that they were essentially necessary to render distant steam navigation *profitable*.

I am, Gentlemen,
Your most obedient humble Servant.
Samuel Hall.

The Committee on Steam Navigation to India *viâ* the Red Sea.

APPENDIX. No. II.

LETTER from Mr. *H. J. Albrecht* to the Committee.

Appendix, No. II.

Letter from H. J. Albrecht.

To the Committee for the Establishment of Steam Communication with India, *viâ* the Red Sea.

Gentlemen,

Feeling convinced that what Lord William Bentinck stated at the meeting at the Jerusalem Coffee-house on the 12th instant is correct, viz: that, " the expenses of Captain James Barber's plan are not likely to be repaid, and, therefore, the sum required to carry it into effect will not be subscribed,'—I now take the liberty of submitting for your consideration a more moderate proposition, together with the reasons why the latter ought to be tried, previous to the extension of the desired communication upon a more magnificent scale.

I quite agree with several of the speakers at the meeting, that " neither Government nor the East India Company are either able or willing to make arrangements suitable to the exigencies of commerce and private accommodation connected with India;" nevertheless, the arrangements of Government and the East India Company (made solely for Government purposes) have been, and still may be, of valuable service to the parties who justly require a more complete steam communication between Great Britain and India. Having thus far remarked upon the present and the proposed steam communication with India, I will now lay before the Committee a plan, which embraces *more* than all the facilities proposed by Captain Barber, and those afforded by the present communication, and, in addition, the advantages of needing only one-half the capital and annual expenditure requisite for the formation of a Company upon Captain Barber's plan, together with a regular communication *every fourteen days*, instead of once a month.

First. I propose: That the " East India Steam Communication Company" make use of all the existing facilities, of advancing their object, which have been established, to communicate with India once in every four weeks, and with Alexandria once in every fourteen days. *The latter part* of the arrangements having been generally admitted to be regular, (making the voyage in the space of eighteen days,) may be at once rendered available to a new company *without any outlay;* it only remains for the proposed Company to provide for the more efficient and more frequent communication between Suez and India, including Ceylon and the Presidencies, in the following manner.

Second. That three steam-boats, to be of sufficient power to make the passage between the Red Sea and India during the Monsoons, (say of 1200 tons and 500 horses' power,) be provided; one to sail every four weeks from Suez to Galle, Madras and Calcutta, after taking on board the passengers, letters and parcels that may have been conveyed by the Peninsular Steam Navigation Company from Falmouth, fourteen days after the Government India mail has been despatched, and for the conveyance of which the East India Company *have now pledged themselves to provide steamers of sufficient power* between Suez and India.

Third. That two steamers of sufficient power (say of 800 tons and 300 horses' power) be provided to ply between Galle and Bombay, to meet the steamers coming and going between Calcutta and Suez.

Fourth. As it was admitted by Lord William Bentinck, Sir R. W. Horton and the other speakers, with only one or two exceptions, that Mr. Waghorn has been mainly instrumental in opening the communication by the Red Sea to India, and as several of the Gentlemen bore witness to his zeal and energy in the cause, that Mr Waghorn be offered the superintendence of the conveyances between Alexandria and Suez, for which he is further qualified by considerable experience.

Gentlemen, the advantages of the plan I have now had the honour to lay before you over Captain Barber's are as follow:—

1. The capital required would be only one-half; say three steam boats of 1200 tons at £40,000 each, and two at £30,000 each, making together a total outlay, in the first instance, of £180,000.

2. The annual expenditure for coals, &c., would be reduced in proportion, and the Company, instead of opposing, would give to and receive assistance from the " Peninsular Steam Navigation Company," who are bound by penalties to be punctual, and do not now derive a fair remuneration for the outlay of capital, although without opposition, consequently a new line of steamers must suffer considerable loss.

3. The communication between India and Suez, which hitherto has failed, might thus be depended on every twenty-eight days by the New Company's boats; and provided the East India Company have equally efficient boats, so as to keep punctual to their present *nominal* times of starting from Suez for Bombay every twenty-eight days, say fourteen days before and fourteen days after the New Company's boats, communication with India would then take place every fourteen days; besides many persons will prefer the overland route when they no longer fear the detention of four weeks in Egypt, should they arrive a ay too late for the steamer.

The shares, amounting to 140,000*l*, already subscribed for in Bengal, may be paid up if a moderate plan be adopted, but if, on the contrary, Captain Barber's magnificent one (including sectional cases to be transported, overland, to and from Suez,) be adopted by your Committee, it is pretty certain that the East Indians will follow the wise and candid council of Lord William Bentinck and withdraw their subscriptions.

In conclusion, gentlemen, it may be admitted that the importance of the desired object quite deserves the liberal allowance, for its accomplishment, that Captain Barber has proposed, but the members of a former Committee, for the same object, can attest that no corresponding liberality is to be expected on this side of the Red Sea, at least before an experiment upon a smaller scale has been found to succeed.

I have the honor to be,
Gentlemen,
Your most obedient Servant,
H. J. ALBRECHT.

14, *East Cheap*,
October 19*th*, 1838.

APPENDIX, No. III.

LETTER from *W. D. Holmes* to the Committee.

Appendix, No. III.

Letter from Mr. W. D. Holmes.

To the Chairman and Committee of the East India Steam Navigation *viâ* the Red Sea.

GENTLEMEN,

AFTER your first meeting in October I had the honour to receive your commands by Captain Barber to attend your second meeting with my Report on the subject of Steam Communication with India. I attended with the same accordingly; but, as you will recollect, was an hour later than the time you fixed, from my misunderstanding Captain Barber's note; and was instructed to attend at your next following meeting. The Report was not read at the next meeting, and I was informed by Captain Barber that my evidence would be received by your Committee instead. After giving evidence on some points connected with iron ships, I regularly attended your days of meeting, until Captain Barber informed me that my attendance was not required. From my communications from time to time with Captain Barber, I find that the views of your Committee are very different to what I have reason to believe they would have been, had you adopted my Report as the base or course of your examination, as is usually the case, to give the projector of a plan some part in the developement of his own project; and I am satisfied very much of your valuable time would have been saved, had I been permitted to have given you the result of my investigation of this subject in my own way; having devoted nearly the whole of my time to the question for upwards of six months, and spared no expense in obtaining information, and data to support the position I had taken.

No doubt, Captain Barber has supplied much of the information which I should have afforded, but many of the most important points have evidently been omitted, and on which mainly depend the success of your undertaking. Captain Barber has hinted that what I have advanced has been deemed visionary; if so, I must be prepared to expect that several statements in my Report will also be deemed visionary. But I would respectfully submit, that when I first proposed, after so many attempts, to shew a profitable plan, the measure altogether was deemed visionary—Captain Barber himself stated that he could not recommend his friends to take up what he knew "must be a losing concern," but who, on a sight of my estimates, acknowledged that "he could do anything with that material;"—it was like many other things, difficult to come at, but when known, like Columbus's egg, only created surprise that it was not known before. Things that were visionary yesterday are in successful operation to-day,—and what is deemed visionary to-day will be successful to-morrow,—I have submitted nothing in my Report that I cannot demonstrate to the satisfaction of your Committee—anything which you may deem the most questionable, if you will do me the honour to call for data for its support by your next meeting, I shall be able to remove any doubts which may exist—I have taken the liberty to hand you a printed copy of the Report for each member. which I intended to have presented for your examination at the first meetings of your Committee. The estimates in the tables will be understood as comparative,—I do not expect, of course, that the profit of 845,064*l*. will be annually realized in a capital of 600,000*l*.,—competition would prevent it, by reducing either the number of passengers, or the rate of passage-money; but if we reduce this on the large ships in Table I., we must reduce in a corresponding proportion the same in the small ships in the same Table, this will reduce the profit to what may be expected in practice, but the loss of 143,344*l*., it is obvious, will also be increased. If I were to say, or to show in the tables, that a passenger could be conveyed, exclusive of mess-charges, for twenty guineas to

Appendix, No. III.

India, and for seven or ten guineas to America in a comfortable and respectable manner. I should not be believed; but this disbelief will not alter the fact—I therefore give the tables to shew the comparative rates at which they can carry passengers with certain profits, leaving them to be worked out in the various ways, of which the data given admits, either by a reduction in the number of passengers, or in the rates at which they may be carried; but if it were not for competition I am prepared to shew, if not to the full extent by practice, at least by admitted analogy, that even the large profits shewn on the tables by way of comparison, could be realized to their full extent. Begging you to pardon this liberty,

I have the honour to be, Gentlemen,
Respectfully your most obedient servant,
W. D. HOLMES.

10, *Lambeth-Square, 3rd December*, 1838.

REPORT, &c.

Mr. Holmes's Report.

Gentlemen,

In compliance with your instructions by Captain Barber, I have the honour to hand you a Report of the details of my plan for a steam communication with India, *viâ* the Red Sea.

After the many failures during some years past in attempts which have been made to show a feasible and profitable plan; the general impression existing in the public mind that the same is still impracticable; the fears expressed by Lord William Bentinck at the public meeting on the 12th inst.; and the annual heavy loss sustained by her Majesty's Government and the East India Company, which so far confirm these doubts, cause me to feel some diffidence in submitting a plan which professes to attain all that can be desired in a steam communication between England and her possessions in the East, *viâ* the Red Sea.

The objects which I deem essential, and which I have sought to attain by my plan, are as follows, viz.,—to establish a regular and expeditious steam communication between England and the three Presidencies and Ceylon, and also between the three Presidencies and Ceylon respectively, during all seasons of the year; that the same shall ensure an adequate return for the capital to be invested; be calculated to meet every reasonable expectation of the commercial interests and the public, at home and in India; and offer such advantages to the British Government and the East India Company as will ensure their co-operation and support; but without being dependent on either for pecuniary aid, leaving any arrangement with them for the conveyance of despatches and mails, as a matter of ordinary business: the profits of the establishment to be ample without such aid.

To all this I became pledged in June last to the Bengal Steam Committee, through Mr. Howell, and their secretary, Mr. Greenlaw, at Calcutta; at which time their British agent, Captain Barber, disputed the practicability of a steam communication between England and India as a profitable speculation by a public company, stating, that a company had already existed for that object, and would have carried it into effect had it been practicable, but they found it was not, without the aid of Government and the East India Company, and until this could be obtained nothing could be done; and that we must await the result of the petition about to be submitted by Lord William Bentinck. He was however convinced of the correctness of my estimates, on an examination of the details submitted to him; and from which period I have had his able co-operation in maturing and demonstrating the project for the examination of your Committee. I shall now give such particulars, as briefly as the subject will admit, that I trust will be calculated to ensure your confidence, and redeem my pledge to the Committee in Bengal.

The primary difficulties presented to former projectors in this communication, and which have now to be overcome, are—

First, the monsoons in the Eastern seas; second, the expense and difficulties of transit across the isthmus of Suez; third, that the Egyptian harbours, and the ports in the Red Sea, are not calculated to receive vessels requiring a very large draught of water; fourth, the expense of fuel, and the means of stowing a sufficient quantity for long voyages. The question, then, is how to meet these difficulties, and ensure a profit on the means employed?

On my attention being called to this subject, my first object was to endeavour to discover the causes of the failure of all other plans in the attempt to show a profitable return for the capital to be invested, without the aid of Government and the East India Company, and the consequent dissolution of the Company which recently existed for carrying the measure into effect.

The following are the principal projectors of plans (see Parliamentary Evidence, July, 1837, and other publications)* viz.:—

Lord William Bentinck, with	steamers of	1000	tons burthen.
Dr. Lardner	„	1000	
Captain James Barber	„	600	
Capt. R. Oliver	„	900 to 1000	
J. Kingston, Esq.	„	450 to 600	
William Morgan, Esq. (about)		650	
Major Head	„	600	

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* These plans have, in most instances, confined the proposed operations to east of Egypt, leaving the passengers to find their own way between England and Egypt.

In the estimates of these and other plans, the assistance of Government and the East India Company were necessary to show a profit. The various opinions as to the stations and modes of working the vessels through the line, are various, and in some particulars, all different to that I propose; but I need not enter into full particulars of the comparison in this respect, as the grand point of profit or loss does not rest here; the main error or cause of failure in former attempts to show a profit, is because the vessels proposed have not been large enough, as I shall hereafter show. One thousand tons burthen will not pay, 1500 tons will. The medium point, or where the expenses and income balance, is between these two sizes; and depending in some degree on the construction of the ship. I therefore recommend 1500 tons burthen as the minimum size to be built by your Committee; and I further recommend that all your vessels be built of iron. Wood vessels of 1500 tons will return an adequate profit on an estimate of prices, and under circumstances which now give the data for calculation: but you could not, with wood vessels, contend with that competition which could be raised against you: iron vessels of this size, as I would build them, would ensure success; but if you began with this size, you would utimately have to replace them by larger, to defy competition. The primary difference, therefore, of my plan compared with others, is that mine is upwards of 1000 tons—theirs' at or under 1000 tons burthen; the difference which I propose throughout the arrangements generally, although considerable, is of a secondary character to this.

To establish my position with respect to the size of the vessels, and the advantages of iron over wood, I beg to refer you to the estimates in the annexed tables, of the capital, expenditure, and income of various sized vessels; the same data and prices being in each case applied throughout, where not otherwise expressed.

I contemplate that your first object should be to attain a regular monthly communication, or twenty-four passages in the year; and, at no distant period, at least every fortnight, or forty-eight passages in the year; but that your first operations will be probably from necessity, or prudence, every six weeks, until you have a sufficient number of vessels to complete a monthly passage. In the tables, I have shown with the different sized vessels, also the respective economy of the working of the forty-eight, twenty-four, and sixteen passages in the year.

I have allowed each size such power as would be able to contend against the monsoons; but the sizes below 1500 tons could not make much way against many gales; 1500 tons and upwards would be able to keep time with tolerable regularity during all periods. Though it would require the maximum efforts of the 1500 ton ships' power against some monsoons, i. e., to work to 600 horse, in ordinary weather not more than 400 horse would be required. whether it be desirable to reduce the power of the vessels working between England and Egypt to 500 horse, which would be sufficient, will be for future consideration. The largest sized vessels have the same power nominally as the 1500 tons ships: but the effective power is greater and can be increased to upwards of 700 horse when required; for particulars of which see the plans. The average working, however, of the 1500 ton ships will be under 500 horse throughout the year, and the largest not exceeding 600 horse.

In the tables I have not deemed it necessary to give estimates for vessels of a smaller size than 700 tons, as they would be quite unequal to the monsoons, besides their disadvantage in point of profit.

The advantages of large vessels over small ones will be traced in the tables, and do not require further description.

The whole of the estimates will bear the strictest scrutiny; and any points regarding the capacity or accommodation of the large vessels, will be seen on a reference to my plans of the same. The small vessels, i. e., the 1000 and 700 tons, I have allowed even more passengers than they can accommodate in the way that India passengers expect; whilst the most superior accommodation is given in the larger ships, thereby giving every possible advantage in the comparison to the smaller vessels.

I have made my estimate on passenger-rates rather on what ought to be done, than on what has been done; and my conviction is, that even these low prices cannot be long calculated on by your Committee. With large vessels you can make further reduction; and you must be prepared to do so. Table 4 is an estimate at lower rates. I have calculated the income from passengers on the longest distance, i. e., between England and Calcutta; the sum charged here should be reduced to Bombay, Madras, and Ceylon; but, as I have also provided especially for a communication between the principal places in India respectively; I have assumed, that, if I leave a passenger for the Bombay branch from England, I shall take up another from Western to Eastern India. This will apply to the stations and places of call generally along the line, and will be an advantage in price rather than a reduction. I have therefore deemed it a sufficient approximation to calculate rates on the long distance. In the large ships an accommodation can be afforded to short passengers beyond the number estimated. Where no freight is shown, the vessels have no capacity for freight.

The difference in the expense of stations between the small and large vessels is, because, with the small ones, a coal depôt is requisite at many intermediate stations; while with the large vessels, no intermediate station is indispensable for a coal depôt; thereby avoiding both the expense of the first cost of the establishment, and its maintenance and attendance. Where stations are deemed necessary, the expense at each will be no more for large vessels than small ones. For the large vessels, I have calculated both on the delivery of coals at intermediate stations, and also to be taken out for the voyage from England and India; and have given them a rate exceeding the actual cost of Welsh coal at Falmouth, and Burdwan coal in the Hoogly; the first of which I propose to use west of Egypt, and the latter eastward. On the employment of the first two vessels (as in Table 3,) I have contemplated the chartering of a small ship for the Bombay branch; or probably the East India Company would lend the 'Berenice' for that purpose, during the first operations, worked and maintained by them and the Government at their joint charge, as an equivalent for the conveyance of mails and despatches; ultimately, as large a boat will be required for the Bombay branch, as for the main line; besides, the advantage of uniformity in the whole shipping, in case of accident, is important. Captain Barber recommended at the public meeting, two small boats to be used for the Bombay and Sincapore branches; which (and the difference in time for the passage) is the only alteration he has made in my plan, as at first submitted to him, and on which I differ with him, for a loss will be sustained, should any small boats be built by you. Sincapore, I would not include at first; nor contemplate at all, as a small branch to meet the Bombay boat at Galle. I would calculate on Sincapore, as the station and coal depôt for branches from Trincomalee and Calcutta to China, and the whole of the Malay Archipelago; it will be the entrepôt for all eastward, on the introduction of Steam-navigation in the Straits.

I only recommend the employment of two boats for a six weeks' communition, until you are prepared for a monthly one. The wood boats and machinery would be totally inadequate to the work (as in Table 3,) for a long time; though I should not fear the iron boats and machinery being put to this test, as long as it may be necessary.

I shall now show on what principles the advantages are obtained, as represented in the Tables:—first, in the use of large vessels, either of iron or wood; and, secondly, of iron vessels especially.

1. The capacity, room, or accommodation of a ship, increases in the ratio of the cube of her linear dimensions, while her sectional area, which gives her resistance, increases only as the square. It will, therefore, be obvious that the larger the ship, the less proportionate power to the tonnage, is required to propel it: for instance, a vessel of 2,000 tons, with engines of 450 horse-power, would be quite equal in her sailing rate to a vessel of 1,000 tons, with 300 horse-power; a vessel of 2,000 tons, with engines of 450 horse-power, would require 150 tons of coals for four days' supply; while two vessels of 1,000 tons, with 300 horse-power each, or together, 600 horse-power, would require 200 tons of coals for the same time: in both cases the same distances to be performed.

The advantage in the accommodation of the larger vessels, is still more important:—

1st.	Two 1,000 ton ships (supposing the capacity to be as the rate)	2,000 tons
	Weight of engines and boilers, at 1 ton per horse	2 × 300 = 600
	Space for coals	1,400
	for 28 days' consumption, at 7 lbs. per horse-power per hour. (No space for cargo.)	
	One 2,000 ton ship (capacity as before)	2,000 tons
	Weight of engines and boilers, at 1 ton per horse	1 × 450 = 450
		1,550
	Coal for 28 days' consumption, at 7 lbs. per horse per hour	1,050
	Space for cargo	500

2nd. The weight of the engines is reduced proportionally, as the size is increased. In small vessels, the proportional space occupied by the engines is from one-third to one-half the extreme length of the ship; while the length required for my proposed ship of 2,617 tons, only one-fifth of the extreme length of the ship is required; and with more than usual accommodation.* The difference in space occupied is more important, when it is considered that in small vessels it is nearly all the best space which is occupied by machinery; while in a large ship, the space is merely a division of fore and aft.

3rd. The expense of the principal officers of the ship, is nearly the same annually in a small ship, as a large one. The charges, therefore, on the tonnage of a small ship, for wages and victualling, very far exceed that on a large one; the extra hands being only sailors at low wages.

The following are some of the advantages of iron ships, over those built of wood.

1. The weight of the hull of a large wood ship, would be 1,500 tons; while the same size in iron, could be constructed with greater strength, efficiency, and durability, with the weight of the hull only 500 tons; therefore allowing 1,000 tons of cargo more than in the wood ship, at the same immersion. In small vessels, the proportionate weights differ less, but in all cases the saving in iron is very great. The weight of the hull of the 1,500 ton ship proposed in the Tables, would, if built of wood, be 900 to 950 tons; if of iron, 350 to 400 tons only; leaving an advantage in favour of the iron ship, of 500 tons for cargo: or, in other terms, the 1,500 ton iron ship would in reality be a 2,000 ton ship, compared with the 1,500 ton wood vessel, while the same engines would only be required; besides these advantages, the cost of the iron and wood ship with the same power, would be at least 10,000*l.* less for the iron than the wood, which will stand as follows; viz.

A wood ship 1,500 tons, with machinery, &c. 70,000 ÷ 1,500 = 47*l.* per ton.
An iron ship 1,500 tons, but in reality 2,000 tons, 60,000 ÷ 2,000 = 30*l.* per ton.

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* In ships of a certain size, one-half of the cubic content is occupied by the power; in a larger size it would be one-fourth; in a still larger size, only one-eighth, and so on.

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Hence the cost of an iron ship and machinery per ton, will only be about two-thirds that of a wood ship.

2. The difference in the wear and tear, is much in favour of the iron ship; 15 per cent. per annum is found requisite for a sinking fund for a wood ship; the wear and tear of an iron ship, will be much less than that of wood; 10 per cent. will be a liberal allowance for an iron ship, while 15 per cent. is a very doubtful one for a wood ship.

3. The saving in room in an iron ship, is equal to nearly two feet beam.

4. Iron ships are not so liable to be wrecked; they might, if properly built, be run on shore, or on the coral reefs; or stranded, without sustaining any material injury; they can be rendered truly safety ships; so that their sinking, or any separation, or opening of their parts, as in the case in a wreck, or, as in the late calamitous loss of the "Forfarshire" steamer, could never occur. This advantage alone should be sufficient to claim a preference, when it is considered that at least 500 British merchant-ships are annually lost, at a great sacrifice of life and property; besides those belonging to the Navy.

5. An iron ship is not liable to injury from hot climates, or lightning, or fire. The whole is kept cool, free from vermin, and in a healthy condition for the crew.

6. It is not liable to leakage; so that no damage can arise from bilge-water to the cargo; or to the crew, from unhealthy odour. How important is this to the corn trade! *

7. In wood ships a considerable elasticity exists throughout the structure; this elasticity and the action of the machinery works one against the other with an alternate action, that has a tendency to destroy each other, so that the best arranged and strongest machinery is never to be depended on; as an extraordinary twist or strain of the vessel may commit damage in a single moment, which the regular work of years could not effect: besides putting all to a stand at a time when the utmost efforts were wanted, as the most likely time for an accident of this kind to happen would be in unfavourable weather, and with wind a-head. The iron ship, on the contrary, is as one solid block or mass, not admitting of the slightest twist, or hog, or change in its position, or truth in its parts one to another; the steam machinery may be fixed immovably in it without any chance of its various parts working loose or becoming twisted: it can work with all the advantages as if fixed on *terra firma* foundation, and the whole ship might be placed on a truck and drawn over the stones without injury; while a wood ship, if put to such a test, would be shattered to pieces.

8. In working wood steam-vessels against a gale, the machinery can only be exerted with great caution, without risking the destruction of the ship. Such is the effect of the alternate action of the ship and machinery against each other, that if the power of the machinery was not to be reduced in a gale, (instead of being exerted to its utmost when most required,) the leakage would sink her; and in many cases, no ordinary built ship, if even secured against leakage, could hold together. But an iron ship would sustain no injury in working its full power in any gale, and would be too buoyant to work under the waves.

9. Iron ships are especially calculated for that vast revolution in the navigation of the world which is at hand; by steam vessels superseding every other navigation or mode of sailing. Without iron ships this could never be, from the difficulty of building very large ships of wood to draw little water, with a due regard to those principles of naval architecture which are indispensable in their structure. The consequence would be that sailing vessels never would be superseded by steamers for the conveyance of general freights, but for iron ships.

Hitherto wood ships of an ordinary build have been as large as may have been deemed manageable under sails. Here has been the limit. But where will be the limits of steam power? The only limits to the size of iron vessels are the draught of water, and extent of traffic. As far as relates to the strength, flotition, and control, there is no limit.

Such indeed are the advantages of iron ships over those built of wood, that they only require to be known and understood to be universally adopted, to the exclusion of all others. No wood ships can compete with iron ships in profit or accommodation; and wherever wood ships are now employed, iron ships may supersede them, and defy competition, even with old established trades. This must be the case even with the "Great Western," "British Queen," and "President" ships; they will hardly be established on their stations, before they must be removed: I fearlessly predict this to be the case, and that after a few years, no large wood ship will be built in England for either mercantile or naval purposes. I make these statements after a mature and deliberate consideration. I feel that I may be saying more than can be at once admitted by your Committee: but whether they may establish confidence or distrust in my opinion, I feel that I should be wanting in my duty both to you and the Committee in Bengal, were I to express less than I have done, having the fullest conviction that, were you to build wood ships, you could not work them longer than you could replace them with iron; consequently great loss would be the result.

After the above statements, it will be presumed that I shall recommend, not only iron ships, but the largest size, for the communication with India; viz. of 2,617 tons; and the only reason why I limit them, even to this size, is, that they may enter every port or road of any consequence on the line of communication between England and India. Should, however, you fear to venture to this extent at first, I would suggest that you build two of 1500 tons, and work those as an experiment, according to Table 3, by which, I doubt not, confidence would be established for the adoption of the largest size; but certainly not smaller than 1500 ton iron ships should be employed, even as an experiment. These, when superseded by the large ones, will be useful for branch-boats to various places in the Mediterranean or Indian Seas—

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* It can only be fully appreciated by those acquainted with an export corn trade, and with the loss arising from damage and uncertainty.

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Mr. Holmes's Report.

they would, with advantage, extend the Bombay branch to Surat and the Indus, and would be always worth their cost. I shall now give the manner of working them; which, as regards the stations, the alleged difficulties in Egypt, and general arrangements, will also apply to the larger sized vessels.

I will suppose the two iron vessels of 1500 tons, at their stations at the end of December, one at London, and the other at Calcutta, to leave London and Diamond Harbour, on the days hereafter named:

From London I start on the 1st of January, in time to get out of the Thames, and to sea on the evening of the same day, with the Monthly Periodicals, 500 tons cargo, and 150 tons of coals, and with such passengers as may prefer embarking in London to a journey to Falmouth. I proceed to Falmouth, and arrive there on the morning of the 3rd; there take in coals for the voyage out and in, to and from Alexandria, say 1000 tons of Welsh coal, and leave Falmouth that night with the London Mail of the 2nd of January; arrive at Gibraltar on the evening of the 7th; Malta on the 11th; Candia on the 13th; and at Alexandria on the morning of the 16th. Distance 3,000 miles, in a little less than 13 days; say 12½ days, or about 240 miles a-day, or 10 miles an hour, including the several short stoppages. At each place of call I would take up freight for freight left, and such additional cargo as the consumption of coals would admit, and as would keep the ship at about the same trim and immersion through the passage, varying only by the reduction of coals from station to station. In ordinary weather, a power of 400 horse will only be worked to accomplish this, in which case the coals consumed will be 350 to 370 tons: it will be safe to take the latter as an average quantity consumed. I will suppose that I have 200 tons of the original cargo, and 200 to 300 tons that have been exchanged at the intermediate stations, 150 tons of which is to cross the Isthmus, and the remainder being consignments in Egypt. I therefore discharge the 150 tons immediately into the boats at Alexandria, with passengers, &c., and proceed that day on the canal of Mahmoodie, and arrive at Adfa, on the Nile, that night, with passengers, and there sleep, leaving the luggage and freight to follow, and arrive at the Nile, and be there and trans-shipped into the Nile steam-boat early the next morning, *i. e.*, the 17th; on that day proceed up the Nile, and arrive at Cairo in the evening, and meet the Indian passengers, who would sleep at Cairo the same night; the English passengers to proceed that night to Suez, arriving there on the 18th, where the Calcutta boat will be in waiting, cleared from its passengers and cargo from the East, and ready to receive the same from the West. During the 18th, the necessary preparations for the voyage eastward are completed, and sails in the evening, with 500 tons of Burdwan coals remaining, and 1000 tons cargo; calls off Cossier, and arrives off Jiddah on the 20th, Camaran on the 22nd, Mocha on the 23rd, Aden on the 24th, Socotra on the 25th, and at the Maldives on the 29th, where the Bombay branch-boat would be in waiting, with which I should exchange passengers and cargo. She would return to Bombay, and arrive there on the 2nd February, calling at Mangalore, and other places on the west coast of India. The Calcutta boat would proceed, calling off Galle, and arrive at Trincomalee on the 1st of February, Madras on the 2nd, and Diamond Harbour on the 5th, and Calcutta on the same or the following day, completing the passage from Falmouth to Calcutta in one calendar month and two days, at a sailing rate of about ten miles an hour, including the short stoppages at stations.

From Calcutta, the boat to sail for Diamond Harbour on the 28th of December, and leave Diamond Harbour on the morning of the 29th, and arrive at Madras on the morning of the 1st of January, Trincomalee on the 2nd, call off Galle, and arrive at the Maldives on the morning of the 5th, and meet the Bombay boat, which would leave Bombay on the 1st, exchange passengers, mails, &c. with the Bombay boat to return to Bombay, and arrive on the 9th; the other to proceed west, and arrive at Socotra on the 9th, Aden on the 10th, Mocha on the 11th, Camaran on the 12th, Jiddah on the 14th, and Suez (calling off Cossier) on the 16th; the passengers and cargo to proceed to Cairo, and arrive there on the morning of the 17th,* and remain there that day and the following night: on the morning of the 18th, proceed down the Nile, and sleep at Adfa, the next morning proceed by the canal to Alexandria, and embark in the English boat that night, the luggage and freight having preceded the passengers the night before, and be on board before their arrival at Alexandria. The boat to leave Alexandria on the evening of the 20th, with 1000 tons of freight and the remaining coals, arrive at Candia on the 22nd, Malta on the 24th, Gibraltar on the 28th, and Falmouth on the 1st of February, completing the passage in one calendar month, and three or four days. I have taken a day or two longer in one passage, to provide for any delay which might occur of a day or two, in meeting in Egypt; in which case the time would be divided by the passage each way, and without inconvenience to either party. After the whole arrangements get into good working order, I would increase the speed so as to ensure the passage within one calendar month between Falmouth and Calcutta. This can be done by the 1500 ton iron boats; and with the large ones, with great ease. It has been questioned whether this dispatch is important? If we judge by what has been done, it may be acknowledged that regularity is more important than dispatch; but this will not meet competition, even by the Cape; in the present arrangements for steam, by the Cape, your Committee have nothing to fear; but the Cape Company may see the error they are now committing, and adopt such measures as will effect a regular communication between Falmouth and Calcutta, *via* the Cape, in six weeks, with great regularity and profit. This could be done.* It would then become indispensable for your Company to take every advantage of your shorter route. And what would be the consequence did you not adopt a first-rate class of vessels? To contend that "regularity is more important than dispatch," which has been the argument in this question, is telling the inhabitants of Manchester and Liverpool, that it is not important whether they get the London mail in twelve hours by railway, or twenty-four hours by the post-road. Will not the answer of the Indian people be the same as those of Manchester or Liverpool, on this point? However satisfied many may be on this side with *regularity* only, the inhabitants of India will expect, and they have a right to demand, the utmost practicable *dispatch* also. Nor would the British Government, or the East India Company, be justified in granting exclusive privileges to any plan which did not include every practicable and safe improvement of the time, so as to ensure a first-rate establishment. In the voyage between Calcutta and Suez, the same arrangements would be adopted for the conveyance of freight, as described between England and Alexandria. At Calcutta, the ship would take 1000 tons of Burdwan coals, and 500 tons of cargo; part of the cargo would be exchanged at Madras, Trincomalee, and with the Bombay boat at the Maldives; and additional quantities received on board, according to the consumption of coal. At Mocha and Camaran, there would be a large importation of Indian produce, and a large exportation of coffee, drugs, and other articles for Egypt. The return would also be great in what constitutes the present trade from Egypt to Mocha, and other places in the Red Sea. Ultimately I expect that manufactures, direct from England, and French and German manufactures, which would be brought from Malta by your Company, or landed direct at Alexandria, would constitute the bulk of the cargo that the steamer could take from Suez; great part of which would be landed at Jiddah, Camaran, Mocha, and Aden; in a trade now hardly opened to Europe. It is not my object now to enter into mercantile details, or I could show a vast field for enterprise, equally to the benefit of the manufacturer and the merchant; and but little reflection wll be necessary on the part of your Committee to convince you that the profits of freight, shown in my tables, large as they may appear, are underrated. Should, however, any doubt exist with you as to the extent of traffic, or the number of passengers I have estimated, I shall be able to give the fullest demonstration on that part of the subject.

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* This spare time will not only be of advantage in the meeting of the two parties, but it is found best to travel in the night during the summer months.

In my plan, as sent to India, I recommended Galle as the Ceylon depôt and the place of junction of the Bombay branch, as stated by Captain Barber; but a further consideration has induced me to make Trincomalee the Ceylon station, which has not only many advantages over Galle, as a harbour, but it is better calculated from its situation to become the great entrepôt, which steam navigation *via* the Red Sea, must make it, for the produce of China and the East. Sincapore will become a kind of sub, or dependent station. I apprehend a great deal of produce, which now is taken from China and other places to Calcutta, will ultimately go to Trincomalee, as a more convenient place for re-exportation and general steam arrangements, for many places in the Bay of Bengal, and westward, without any diminution to the trade of Calcutta. I recommend the Maldives as the station for the Bombay branch, in preference to Galle, because a distance of nearly 1000 miles will be saved to the Bombay boat every voyage; and the longer time required in that boat, and the run of the English Bombay mail to Galle would be a just cause of complaint on the part of the Bombay inhabitants. There is a further advantage in the shorter distance, for a station from Socotra eastward: other plans have contemplated the Bombay branch to unite at Socotra; but this would not afford the advantages which I contemplate in the communication between the Presidencies and other places on the west coast of India respectively; and it would be the most objectionable, on account of the monsoons, as the boats would have to go "right a-head" against them; but in going to the Maldives they would be met obliquely.

The alleged difficulties in Egypt have been merely in reference to the mode of transit *hitherto adopted*, viz.: by the conveyance of passengers and goods over-land, on the backs of animals, a distance of seventy-two miles, between Suez and Cairo. Between Alexandria and Cairo there is water communication,† for which I recommend boats, and general arrangements, as shown in the plans, and described in the detailed estimates, which will be submitted to you for examination by myself or Captain Barber, when called for; and which do not admit of the least question of difficulty. Between Cairo and Suez I would have omnibuses for the passengers, and vans, which will also be found in the details above referred to. The road between these places has been proved to be good, and well adapted for running carriages. Another objection has been made, that there is no water between Cairo and Suez; if this had to be carried, as it now is, for the supply of the cattle, &c., it would amount to a small addition in the cost of transit,—that is all; but it can be shown from analogy that good

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* Were it not for steam communication, *viâ* the Cape, which must soon supersede all sailing vessels in the conveyance of freight between England and India, the Company, *viâ* the Red Sea, would not only command passengers and traffic, but also the bulk of freight between England and India. The difficulties of crossing the Isthmus would become merely a matter of expense. The saving, in time, would be equal to a profit of 1½ per cent. on the interest of the investment in articles constituting the cargo, which would far more than pay the charges in Egypt, besides other advantages of a quick return.

† This, for a distance of fourteen or fifteen miles, is interrupted for several months in the year for want of water; but this difficulty is easily removed, at a very small cost; while it existed, omnibuses and vans could be employed, as between Cairo and Suez.

Appendix, No. III.

Mr. Holmes's Report.

water could be found by boring at any point on this line, and at about what depth; and were this not the case, or did it present a greater difficulty, 25,000*l.* or 26,000*l.* would lay down a pipe the whole distance, and consequently provide a self-acting supply from the Nile, at any point where a plug might be fixed. The "difficulties" in Egypt, with the plague, &c., are, indeed, a mere bugbear, and only require provision of a very ordinary character.* For the conveyance of the boats on the canal, and the carriages between Suez and Cairo, I would, in the first instance, get the work done by hired cattle, at a mileage, in which there is no difficulty. In the event of a fortnight's, or weekly, communication, it might be desirable to employ cattle, the property of the Company, and keep them constantly employed in the conveyance of freight; so that a larger quantity might cross the Isthmus, at a less rate of charge; and that brought by one boat to Alexandria, or by other boats, from other Mediterranean ports, might cross during the intervening fortnight, or week, so that they would proceed from Suez by that boat, which would leave a fortnight, or week, after the arrival of the goods at Alexandria; this delay for cargo would, in many cases, be unobjectionable. This, however, I am of opinion, would not be necessary, and the expense of purchasing cattle, and the requisite establishment for their accommodation, would be altogether avoided, to whatever might be the extent of the traffic. The Pacha of Egypt having repeatedly declared his readiness to lay down a railway, if he can have any assurance that the English public will use it, at a very moderate remuneration, and would afford every possible facility; and he has already a large part of the materials delivered in Egypt, for its construction.† But this is not all. It is to the interest of the Pasha of Egypt, and especially to the interest of England, and the East India Company, while England has the "dominion of the seas," both in a commercial and political view, that a canal should be constructed between the Mediterranean and the Red Sea direct. These interests will be shortly manifest on the adoption of the line by your Committee, and nothing will prevent the rapid accomplishment of this important junction of the eastern and western seas to admit the passage of large vessels. This should not be omitted in the calculations of your Committee, though it may not be necessary that you make especial provision for it immediately.

I believe I have in this outline shown a practicable and profitable means of communication according to the position I have taken: the details that will be required to support what is here advanced, are all ready, and can be submitted when called for; every point has been carefully worked, on well-established data, although it may be new in itself, and the working of the "Great Western" and the small ships to America corroborate my estimates to a great extent, though I had not the advantage of these experiments at the time my plan was produced. If the communication *via* the Red Sea, can be conducted with the advantages here shown, it is only fair to infer that the cordial support and interest of the British Government and the East India Company will be obtained, to whom it will save, at a moderate estimate, 150,000*l.* per annum, in expenses now incurred in the Mediterranean and Eastern defective packet establishments. Of the support of the British and Indian public there can be no question. The result of your labours will be, that not only the most distant and most valuable of the British possessions will be brought home, but the rate of passage will be reduced ultimately to an incredibly small fraction of that which has hitherto been charged; affording every confidence and facility for the employment of a large portion of the surplus capital and labour of this country, equally to the advantage of the mother country, and her eastern dependencies and neighbouring states; extending immense benefits to countless millions; who will, in return, give new life to the manufactures and commerce of Great Britain, and a political ascendancy that cannot be obtained and secured by any other means than by that union of interest which cheap and rapid intercourse will establish and maintain.

I have the honour to be,
Gentlemen,
Respectfully, your most obedient Servant,
W. D. HOLMES.

5, Cannon-row, Westminster,
October 18th, 1838.

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* Since my plan for the conveyance of passengers and luggage over Egypt, by omnibuses and vans, was first proposed, the Bombay Steam Committee have made arrangements for a conveyance by means similar to what I proposed; and in the first instance, may supply every requisite accommodation without any capital invested in Egypt by your Committee.—*See the Times of this day.*

† See the Evidence of Mr. Briggs and Mr. Galloway, in the Parliamentary Committee of last year, on the subject of Steam Communication with India.

TABLES TO MR. HOLMES' REPORT

ON STEAM COMMUNICATION WITH INDIA *VIA* THE RED SEA.

	TABLE 1. PASSAGE EVERY FORTNIGHT.		TABLE 2. PASSAGE EVERY MONTH.		TABLE 3. PASSAGE EVERY SIX WEEKS.		TABLE 4. PASSAGE EVERY FORTNIGHT.
	WOOD SHIPS.	IRON SHIPS.	WOOD SHIPS.	IRON SHIPS.	WOOD SHIPS.	IRON SHIPS.	IRON SHIPS.
	Passage, 2 months. Steaming, 50 days.	Passage, 36 days. Steaming, 30 days.	Passage, 54 days. Steaming, 44 days.	Passage, 40 days. Steaming, say 36 days.	Passage, 36 days. Steaming, 32 days.	Passage, 36 days. Steaming, 32 days.	Passage, 36 days. Steaming, 30 days.
e and power of Steam Vessels	700 Tons—300 Horse.	2,617 Tons—600 Horse.	1,000 Tons—400 Horse.	2,617 Tons—600 Horse.	1,500 Tons—600 Horse.	1,500 Tons—600 Horse.	2,617 Tons—600 Horse.
st of each Ship	£36,000	£70,000	£45,000	70,000	£60,000	£50,000	70,000
umber required	12	8	7	5	2	2	8
	£432,000	£560,000	£315,000	£350,000	£120,000	£100,000	£560,000
tlay at Stations	15,000	2,000	15,000	2,000	7,000	1,000	2,000
itto in Egypt	27,000	27,000	27,000	27,000	25,000	25,000	27,000
lance for Coals and Contingencies	26,000	11,000	43,000	21,000	20,000	20,000	11,000
Total Capital to be invested	£500,000	£600,000	£400,000	£400,000	£172,000	£146,000	£600,000
ANNUAL CHARGES.							
oals at 7 lbs. per horse-power per hour	at 40s. 108,000	at 40s. 129,600	at 40s. 63,360	at 40s. 73,000	at 30s. £24,000	at 15s. 12,000	at 15s. £51,000
xpenses in Egypt	20,000	48,160	15,000	30,000	Extra	Extra	Extra
ages and Victualling Ships	36,000	33,176	28,700	24,235	8,500	8,500	33,176
harges at Offices and Stations	5,000	5,000	5,000	5,000	3,500	1,500	5,000
nsurance	15,000	18,000	12,000	12,000	6,000	5,000	18,000
ear and Tear: £15 per cent may be taken as a minimum on Wood Ships, and £10 per cent., a maximum on Iron Ships	75,000	90,000	60,000	60,000	18,000	10,000	90,000
nterest on Capital at 5 per cent.	25,000	30,000	20,000	20,000	8,600	7,300	30,000
Total Annual Charges	£284,000	£354,936	£204,060	£224,915	£68,800	£44,300	£227,176
INCOME.							
assengers:—							
st rate, Number and Rate, (less mess at 10s. a day).	40 at 80 guineas £2,240	200 at 80 guineas £13,800	70 at 80 guineas £3,780	200 at 80 guineas £12,800	100 at 80 guineas £6,200	120 at 80 guineas £7,440	200 at 50 guineas £7,900
nd „ „ 5s. „	12 at 40 „ 324	80 at 40 „ 2,760	12 at 40 „ 348	80 at 40 „ 2,560	20 at 40 „ 620	20 at 40 „ 620	100 at 30 „ 2,200
rd „ „ 2s. „	12 at 20 „ 184	80 at 20 „ 1,440	12 at 20 „ 187	80 at 20 „ 1,160	20 at 20 „ 310	20 at 20 „ 310	100 at 15 „ 1,100
	2,748	18,000	4,315	16,520	7,130	8,370	11,200
reight	- - -	1000 Tons at £7 7,000	- - -	2000 Tons at £7 14,000	300 Tons at £7 2,100	300 Tons at £7 2,100	2000 Tons at £7 14,000
		25,000		30,520	9,230	10,470	25,000
Number of Passages yearly	48	48	24	24	16	16	48
otal Income	£130,656	£1,200,000	£103,560	£732,480	£147,680	£167,520	£1,209,600
Charges to deduct	284,000	354,936	204,060	224,915	68,800	44,300	227,176
Total Profit or Loss	Loss - £143,344	Profit - £845,064	Loss - £100,500	Profit - £507,465	Profit - £78,880	Profit - £123,220	Profit - £982,424

The largest Vessel in these Tables will not exceed the draught of water of the "Great Western."

Where Coals are charged 40s. per Ton, they are to be taken up from Station to Station, where charged 15s., they are taken out by the Ships, for the whole Voyage from Calcutta and Falmouth.

Different quantities of Freight by the same Ships are shown, but the maximum quantities can be taken.

The Profits shown on the large Iron Ships being more than an adequate return, the consequence would be a still further large reduction on the lowest Passengers' Rates here given. The rate of 10s. per diem, for Passengers' mess, will also admit of reduction, when it is considered, that the largest period between Stations will never exceed four days, and seldom two days, and the cheap rate at which provisions may be purchased alo[illegible] line: 10s. is a liberal allowance in Sailing Vessels *viâ* the Cape.

APPENDIX, No. IV.

EXTRACT from Mr. Greenlaw's Report.

Extract from the Report of the Committee of the New Bengal Steam Fund, read and approved at a Public Meeting of the Subscribers in Calcutta, 17th August, 1838.

Appendix, No. IV.

Mr. Greenlaw's Report.

"The Committee have always been mindful of passing events bearing on the question; and when circumstances have seemed to require a renewed expression of public opinion, they have not hesitated to make the appeal which, they are happy to say, has always been met to their entire satisfaction.

"The late failure of the Semiramis to effect the passage from Bombay direct to the Red Sea, in the S. W. monsoon, is an event which has necessarily attracted the attention of the committee. They are as yet ignorant of the actual particulars, but, be they what they may, the failure cannot in any way impugn the practicability of establishing the Comprehensive Scheme; for if, instead of proceeding direct from Bombay, the steamer had at the same period left Calcutta, she would have arrived at Galle with ease in nine days, including one day's stoppage at Madras; at Galle she could have been readily joined from Bombay even by a sailing vessel in seven days. Thence proceeding to the southward through the Maldives, and making a course to bring Cape Guardafui to bear N. N. W. about 300 miles, she would avoid altogether the strength of the monsoon in the Arabian Sea, and from that point having a fair wind to the Cape, she might put out her fires, clean her flues and boilers, and be prepared in good steaming order for the entrance into the Red Sea. No one yet has said that a proper steamer would have any real difficulty in passing from Cape Guardafui to Suez at any time of the year: while the steamer was thus passing from Galle to Suez, the Bombay vessel, whether steamer or sailing vessel, might leisurely proceed by the southern passage to Socotra, there to await the return of the Calcutta steamer, and thence proceed to Bombay with the packets, parcels, and passengers for that place, the Calcutta steamer of course proceeding on to Galle, Madras and Calcutta; and this is the operation of the Comprehensive Scheme during the S. W. monsoon—an operation at once furnishing the greatest possible accommodation to passengers, packets, and parcels to and from all parts of India. This failure of the Semiramis, and its bearing on the main question, as above noticed, will necessarily require attention hereafter, if a further expression of public opinion should be necessary. The disappointment and unnecessary expense to which correspondents connected with the letters sent by her will have been subjected, will afford a strong argument for the communication being put on the most effective and comprehensive footing possible.

Month.		Number of Despatches.	Time occupied.	
			Days.	Hours.
1837	June	2	13	1
	July	3	13	10¼
	August	4	13	9¼
	September	No mails.		
	October			
	November	3	14	4¼
	December	2	11	20¼
1838	January	1	13	17
	February	1	15	3¼
	March	3	12	10¼
	April	4	13	12¼
	May	4	12	21¼
	June	6	13	12¼
	July	4	13	20¼

"Again, the committee have not been unmindful of the great length of time occupied in the transmission of the [illegible] between Calcutta and Bombay; in the above table is a statement of the number of [illegible] taken in that transmission, during the year from June 1837 to June 1838, which the committee would beg the subscribers and the public in general to compare with the [illegible] of a letter from the then chairman of the Court of Directors to the address of the President of the Board of Control, dated so far back as

March 1837, bearing in mind, at the same time, that the English mail for Calcutta is divided into three or more portions (noted in the table as 'number of despatches'), and forwarded on subsequent days, so that in the case of many letters, some days are to be added to the number in the table, as that of the transmission of at least a part of the English mail.

"'The Court are aware that it will be necessary to promote, by every possible means, facility and quickness of communication between Bombay and Calcutta and Madras; and they have observed, by recent intelligence, that the Government of India has adopted arrangements for the acceleration of the Dawk, by which packets may be conveyed from Bombay to Calcutta in from eight to ten days, and to Madras in about seven days, and which the Court consider to be a much more rapid and certain, and unquestionably more economical, mode of communication, than a steam conveyance."

"It will be seen that this understood reduction of the time of the Dawk, from Calcutta to Bombay, to from eight to ten days, is expressly mentioned with a view to establish that letters by the English mail would reach Calcutta quicker by the Bombay route than by steam from Socotra, and therefore the actual number of days taken during the last twelve months may fairly be employed to show that the route by steam from Socotra would be the quicker mode of conveyance, independent of other more important advantages. Assuming that a steamer in the S. W. monsoon would, from Socotra, steam at the rate of 200 miles per diem, as well to Bombay as to Calcutta, then the first part of the Calcutta mail would arrive *viâ* Bombay, according to the *minimum* time occupied in the transit from Bombay to Calcutta, in 18 days, and according to the *maximum* time in 21 days from Socotra, and the remaining parts from one to five days after; bringing, after all, nothing but light letters and newspapers at a heavy cost for postage, to the spot, moreover, to which and whence* nearly one-third of all the letters to and from India are sent and despatched; while the whole would reach Calcutta by steam *viâ* Galle in 17 days, allowing 12 hours' delay each, to Galle and Madras; including in that, whole letters, packages, and parcels, without limitation as to weight; and above all, that most important and indeed indispensable essential in any really beneficial mutual intercourse—man."

Mr. MANGLES here interrupted the reading of the report, by enquiring whether any representation had been made to Government regarding the division of the packets into five, or as to the number of days which were occupied in the transit of the mail.

Mr. GREENLAW answered in the negative, adding that the Steam Committee had abstained from making any representation, from a consideration that it was the peculiar duty of the Chamber of Commerce.

Mr. JAMES CULLEN intimated that the Chamber had not addressed Government on the subject.

Mr. MANGLES rejoined, that he thought the delay very discreditable to the Government, and most injurious in its consequences.

The report proceeds:—

"It is necessary also to bear in mind that every improvement whereby the speed of steamers is increased, is so much additional time gained, and bringing even the letters alone by steam from Socotra.

"With respect to the transit of the mail from Calcutta to Bombay, the Postmaster-General regularly gives notice that from 13 days in the N. E. monsoon to 15 days in the S. W. constitute the least safe period.

"This fact of the more speedy course being by steam, especially during the S. W. monsoon, under existing circumstances, with the much greater reduction of time by steam, when the more speedy steamers, such as the Great Western and Victoria, are employed, combined with, it may be said, the impracticability of any arrangement being made whereby letters, newspapers, and monthly periodicals, to say nothing of passengers, can be passed across the country to Calcutta, should also have attention and representation in the event of the last petition not being successful. The committee can only assure the subscribers and the public, that while they have the satisfaction of enjoying their confidence, they will unremitingly continue their exertions until success is obtained.

"The accounts are as usual laid upon the table. The balance on the 31st ult. was Company's rupees 43,822-8-8, subject to a letter of credit for 1000*l.* on the house of Sir C. Cockerell and Co., in favour of the home committee. The item on account of printing and advertising is very large. It has mainly been incurred by advertising in all the papers of India the documents connected with the conditional subscriptions of shares in a scheme for establishing a communication by steam from Calcutta, Madras, and Ceylon, to England, by way of the Red Sea, by means of a company: the number of shares is 2579, which, at 500 rupees per share, amounts to 12,89,500 rupees, subscribed by 758 individuals and firms. Mr. Turton, with whom the suggestion originated, having left England, the committee have made over the lists and documents to Captain Barber, and they are satisfied that when the matter is by him properly brought before the British public, it cannot fail to have a bene- [illegible] the public as on the authorities—on the public, by showing those [illegible] to establish the communications, that they may depend upon [illegible] although little aid has been received from Madras, yet the [illegible] that there will be no want of support at that presidency,

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* [illegible] between England and India is not to be considered as including [illegible] and for despatch to, the Mofussil, but expressly as the corre- [illegible] neighbourhood.

Appendix, No. IV.

Mr. Greenlaw's Report.

when a well-arranged and sufficient scheme is actually proposed. The authorities at home, it is presumed, will not fail to see in the general support given to the proposition, and especially in the really moderate individual subscriptions, that the parties subscribing have not been led by enthusiasm, or other motives, to subscribe largely for shares; but that they have soberly and with a fixed purpose to take up their shares, evinced the steady strength of their desire to have the communication established at the earliest period in the most perfect and efficient form possible.

"The committee regret to report the death of their late colleague, Mr. Dobbs, whose attendance in committee and zealous interest in the success of the Comprehensive Scheme were unremitting. It becomes necessary for the subscribers to choose a successor.

" By order of the committee of the New Bengal Steam Fund,

" Town-hall, Calcutta, Aug. 17, 1838." "C. B. GREENLAW, Secretary.

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